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PUBLIC FINANCE IMPLICATIONS OF POPULATION AGEING

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Abstract

The paper simulates long-run debt paths for the federal and each provincial-territorial government using a model that captures the effects of population ageing on economic growth and government revenues and expenditures. The model incorporates alternative assumptions about the rate of growth of health spending per capita, the rate of growth in federal transfers to provinces and territories and the allocation of federal and provincial budget surpluses between debt repayment, tax cuts and expenditure increases. A variety of spending scenarios and macroeconomic regimes assess the degree to which governments can engage in discretionary spending further to that contained in the basecase scenario. We find that the majority of jurisdictions could significantly reduce or eliminate their net debt within the next twenty years even in the face of ageing-related cost pressures. The main conclusion of the paper is that population ageing alone should not cause major problems for public finances. For instance, under a scenario where real health spending per capita within each age cohort is allowed to grow by one per cent per year (the average observed over the late 1970s and early 1990s) and budget surpluses are allocated in equal share between debt repayment, new spending and tax reduction, the debt-to-GDP ratio falls in most provinces and territories. However, macroeconomic regimes which first place a greater emphasis on debt reduction are a necessary part of the fiscal mix.

Résumé

Cette étude simule l'évolution à long terme de la dette du gouvernement fédéral et de chaque province et territoire à l'aide d'un modèle qui tient compte des effets du vieillissement de la population sur la croissance économique, de même que sur les recettes et les dépenses de l'État. Le modèle intègre à tour de rôle des hypothèses sur le taux de croissance des dépenses de santé par habitant, le taux de croissance des transferts fédéraux aux provinces et territoires et la répartition des excédents budgétaires fédéraux et provinciaux entre le remboursement de la dette, les réductions d'impôt et l'augmentation des dépenses. Divers scénarios de dépenses et régimes macroéconomiques évaluent dans quelle mesure les gouvernements peuvent engager des dépenses discrétionnaires au-delà de ce que prévoit le scénario de base. Les auteurs constatent que la plupart des administrations pourraient réduire nettement ou éliminer leur dette d'ici 20 ans en dépit des tensions de coût liées au vieillissement de la population. Selon la principale conclusion de l'étude, le vieillissement de la population n'engendrerait pas, à lui seul, de graves problèmes pour les finances publiques. Par exemple, en supposant que les dépenses de santé réelles par habitant à l'intérieur de chaque cohorte d'âge augmentent de 1 % par année (soit la moyenne observée à la fin des années 70 et au début des années 90) et que les excédents budgétaires sont répartis également entre le remboursement de la dette, les nouvelles dépenses et les réductions d'impôt, le ratio dette-PIB diminue dans la plupart des provinces et territoires. Toutefois, le cadre budgétaire devrait comprendre nécessairement des régimes macroéconomiques qui insistent sur les réductions de la dette.

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Executive Summary

Issue

Despite a new era of balanced budgets, Canada still faces several important fiscal challenges: reducing high levels of public debt, lowering the tax burden, and investing in key priority areas. However, one further challenge looms on the horizon – that of population ageing. Twelve years from now, the first of the baby-boom generation will reach retirement age. This will mark the beginning of a thirty-year period over which the elderly share of Canada's population will rise by more than 80 per cent. The fiscal consequences of this phenomenon are potentially significant.

Population ageing will put strong upward pressure on public expenditure in the areas of health care and old age security. These pressures will be compounded because the life expectancy of Canadians is continually increasing. Population ageing will also slow labour force growth, reduce GDP growth, and ultimately limit revenue growth to rates below those experienced historically.

It is important to note that ageing pressures will emerge slowly. For example, over the 65 year period between 1975 and 2040, ageing pressures are expected to add less than one percentage point per year to the annual growth in health expenditures. Today, annual growth due to ageing amounts to only 0.8 percentage points, and ageing pressures are expected to remain at or just below the average of the past 25 years until 2005. At this time, as baby-boomers begin to move into the higher health care cost categories, ageing pressures will increase to a maximum of 1.5 percentage points (in 2012), and remain above average until 2030. Thereafter, ageing pressures will decrease in importance until 2040, when ageing is expected to contribute only 0.2 percentage points to annual health expenditure growth.

In this context, it is important to assess the possible implications of ageing for fiscal policy.

Analytical Framework

The long-run debt paths of the federal and each provincial-territorial government are simulated in a framework that explicitly captures the impacts of ageing on expenditure, revenue and GDP growth. The analysis is conducted on a shock versus control basis. The basecase scenario represents a *status quo* policy environment that allows expenditure increases for inflation and demographic change, but not for discretionary policy action. Measures announced in the 1999 federal and provincial-territorial budgets are included in the analysis, while those announced in the 2000 budgets are not.

The alternative fiscal regimes vary the allocation of budget surpluses and the assumed debt-to-GDP ratio target under a variety of scenarios for health spending and CHST growth. In the basecase, it is assumed that health spending per age cohort is held constant in real per capita terms and CHST entitlement growth grows in line with nominal GDP after 2005. In the alternative scenarios, real per capita health spending per age cohort is assumed to grow by 1 and 2 per cent per year, respectively. It is assumed that the federal government increases CHST transfers in line with GDP growth until the year 2010 when demographic pressures begin to accelerate. Thereafter, CHST funding rises with aggregate provincial-territorial health spending growth. Budgetary surpluses are allocated either entirely to debt reduction (tight fiscal

environment), or entirely to spending increases and tax relief (loose fiscal environment) or equally between debt reduction, spending increases and tax relief (middle fiscal environment). The middle fiscal environment assumes that debt reduction is undertaken to achieve a specific debt-to GDP target. Once the debt-ratio target is achieved, subsequent surpluses are allocated equally between spending and tax reduction.

Results

Simulations show that under the basecase and the range of alternative scenarios presented, the majority of provinces and territories could substantially reduce and even eliminate their net debt within 20 years. Consequently, some governments could engage in discretionary fiscal action *further* to that contained in the three alternative spending scenarios while still significantly decreasing their debt.

Jurisdictions with the slowest population growth rates or largest increases of elderly population are not necessarily the ones most likely to experience the largest negative fiscal consequences. Population ageing raises the cost of health care and old age security, but reduces the cost of education, and to a lesser degree, provincial social programs. Though the offset is not be complete, the compensatory effect can be significant. Indeed, the more pronounced the ageing, the larger the offset will be. In this sense, the fiscal costs of population ageing are somewhat self-limiting. If per capita expenditure levels are maintained, a shrinking population base will reduce total program spending. As such, high per capita spending growth may still yield low total spending growth.

Key Issues and Policy Implications

Results suggest that under fiscal policy scenarios that provide for substantial long-run debt reduction, most governments would still have the fiscal room for tax relief and increased spending, relative to current levels. Decisions taken now concerning the allocation of fiscal dividends will affect the size of future fiscal dividends, and therefore, affect the ability of Canadian governments to engage in discretionary initiatives.

Lowering debt loads would free fiscal resources otherwise earmarked for debt servicing. The availability of these resources will become increasingly important as demographic change accelerates early in the next century. Importantly, it is shown that significant debt reduction can be achieved before the onset of these demographic pressures. Indeed, the demographic pressures will only emerge gradually and will not have significant impact until the end of the decade. Governments therefore, have an opportunity over the next ten years to plan and prepare for the pressures on spending that will arise from population ageing.

Though results indicate that population ageing need not have any catastrophic repercussions for public indebtedness, this is not to say that public finances will be unaffected by ageing. The economic and fiscal impacts of ageing will significantly lower the *rate* at which federal and provincial-territorial governments programs can be enriched.

1. Introduction

1.1 Government Fiscal Consolidation and the 'Virtuous Circle' of Debt

Since Canadian governments began their fiscal consolidation efforts, several reports have demonstrated how the 'virtuous' side of the deficit-debt dynamic could very quickly reduce Canada's public debt load.[1] Indeed, most analyses show that under a range of "prudent" economic assumptions and no changes in policy, public debt could be *eliminated entirely* within 20 years. Alternately, these reports argue that room exists to gradually cut taxes and/or enrich program spending in the coming years, while still substantially reducing the debt-to-GDP ratio over the medium term.

A crucial milestone on the road to the virtuous side of the debt circle has now been realised – public sector consolidation is largely complete and deficits have been eliminated in most jurisdictions. With the elimination of deficits, focus is now turning (on the basis of existing policies) towards the management of emerging surpluses and their disposition in support of other major policy challenges. Included among these are strategic investments in areas such as health care, lowering Canada's tax burden and decreasing the level of public sector indebtedness. In 1999-00, total government sector debt was estimated at just over 90 per cent of GDP, which is high both historically and internationally.

Against this backdrop lurks the longer-term issue of demographic change. The phenomenon of population ageing and how it will affect government fiscal balances is receiving an increasing amount of attention as one of the key structural challenges ahead.[2]

1.2 Demographic Pressures and the Government Budget Balance

The continuation and acceleration of current demographic trends into the next century has strong implications for public finances. In particular, over the next 40 years, population ageing will put considerable upward pressure on public expenditure in areas such as old age security and health care. However, the timing of ageing related pressures is critical. Ageing related expenditure growth will emerge slowly adding only modest increases to spending over the next 10 years.

In 1992, the Department of Finance, in conjunction with the provinces and territories, analysed the links between ageing and spending pressures in the *Federal-Provincial Study on the Cost of Government and Expenditure Management*. This study estimated how demographic and other cost pressures would affect long-run federal and provincial program spending. The main conclusion was that as long as program generosity advanced at a 'reasonable' pace, long-term program costs would be manageable. However, the *Cost Drivers* study dealt only with program spending and not government revenue. The omission of the revenue side of the government ledger was significant because no conclusions could be drawn about how demographic and other

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1 Reports have been issued by (among others): the Royal Bank, the Bank of Montreal, Wood-Gundy, Sun-Life Canada and the IMF.

2 Currently, the OECD, G7, APEC, and the G-10 are all studying the economic and fiscal consequences of ageing populations, with the policy focus largely on public pension reform.

cost pressures could affect overall budget balances and public debt. Furthermore, most other reports that extrapolate government revenue and expenditure to estimate future debt paths – and predict rapid debt reduction – contain the simplifying but simplistic assumption that revenue and expenditure will remain fixed as a share of GDP. It therefore remains an open question whether debt reduction, spending reinvestment in key priority areas, lower taxation and future spending pressures are fiscally 'reconcilable'.

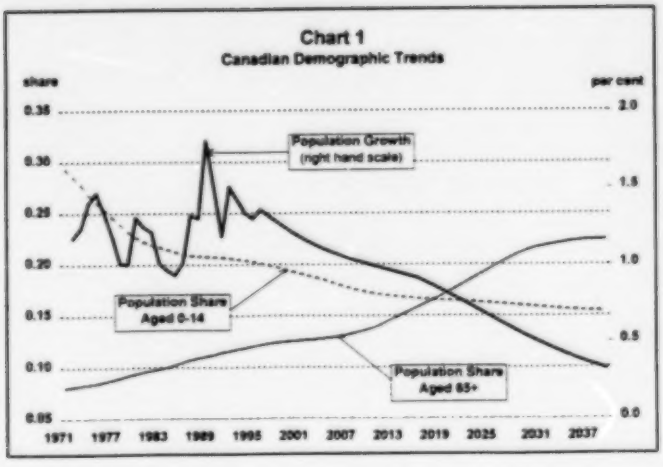
As a result, the goal of this study is to present a more comprehensive examination of the fiscal implications of demographic change on government revenues and expenditures, and hence on long-run debt paths. The paper: i) identifies likely sources of demographic cost pressure on government fiscal balances; ii) estimates the magnitude of these cost pressures; and, iii) incorporates these estimates into long-run government debt simulations.

The remainder of the paper is organised as follows. Section 2 discusses the economic and fiscal incidence of demographic cost pressures. Section 3 details the methodology and assumptions used to quantify these cost pressures. In Section 4, the estimated pressures on various government revenue and expenditure categories is shown. In Section 5, federal and provincial-territorial debt paths are extrapolated. Section 6 examines the implications of these simulations for health care spending under various macroeconomic regimes. Section 7 summarises the major results and offers some conclusions.

2. Demographic Pressures and the Government Budget Balance

Changes to Canada's population structure over the next fifty years are expected to be profound. Currently, Canada's population growth rate is slowing and its population is ageing, trends which have been developing over the past fifty years. Immediately following World War II, Canada's birth rate soared for a period of 20 years – the so-called baby-boom. However, by the mid-1960s, this high rate began to fall dramatically. In 1959, about the middle of the 20 year long baby-boom, there were, on average, 4 births per woman of child-bearing age. By 1972, this rate had dropped by half. The birth rate reached a low of 1.57 in 1987, although it recovered marginally to 1.64 by 1996.

Canadian life expectancy, meanwhile, has been rising continuously for at least the past century, with gains ranging between 1 and 5 years per decade. Life expectancy in 1954 was 68 years for males and 75 years for females. In 1996, it reached 75.7 years for males and 81.4 years for females. The combined result has been slower population growth and an ageing population that is dominated by a heavy concentration among 32 to 50 year-olds. Importantly, these trends are expected to persist into the next century (Chart 1).

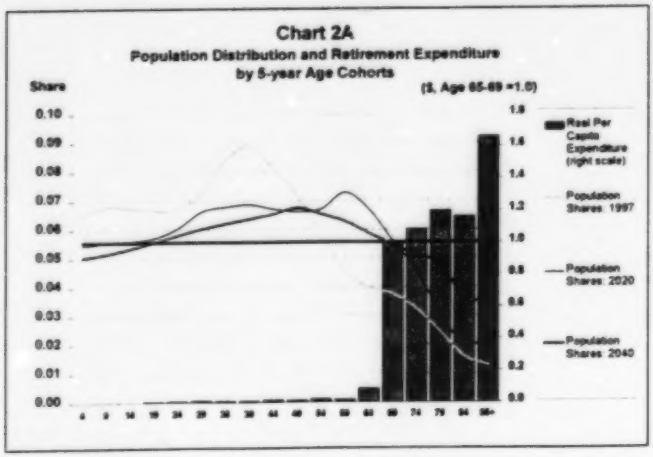


Starting in about the year 2011, the forces of population change will accelerate and intensify as the eldest of the baby-boom generation enter their retirement years. Public finances could be subject to sharply higher cost pressure on various fronts.

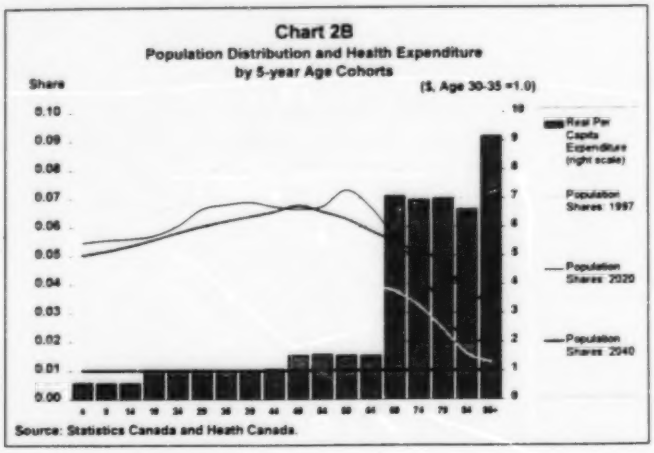
2.1 Direct Impact of Demographics on Government Expenditure

The most obvious channel through which demographic pressures will affect future fiscal balances is the expenditure channel. The consumption of public goods is not uniform across generations. Consumption of public goods is heaviest among the young and the old, but particularly the old. Two programs in particular account for this: retirement income and health care. The impact of demographics on the retirement income system is straightforward – this program is targeted at a specific age group, and spending rises as population becomes more concentrated in that age group (Chart 2A).[3]

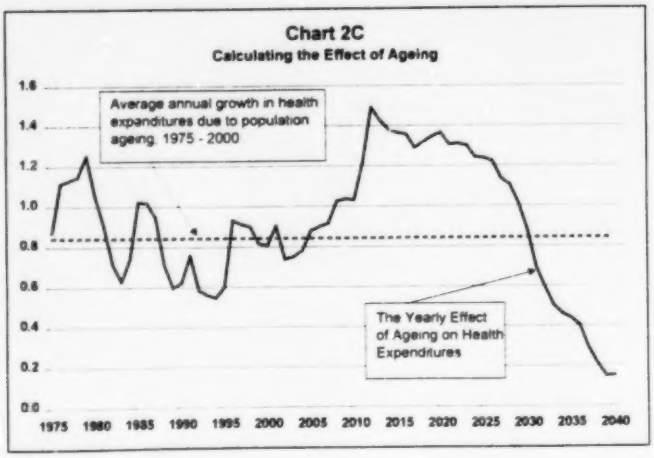
3 Province specific relative expenditure shares are from Matier, C. and Fougère, M. "The Sustainability of Fiscal Policy in Canada: A Generational Accounting Perspective by Jurisdiction" paper presented at the 48th International Atlantic Economic Conference. October 1999.



Health care, meanwhile, is a universal program provided to all age groups. However, the cost of health care increases dramatically with age: those aged 85 and over absorb over nine times the per capita health care dollars devoted to younger aged cohorts (Chart 2B).

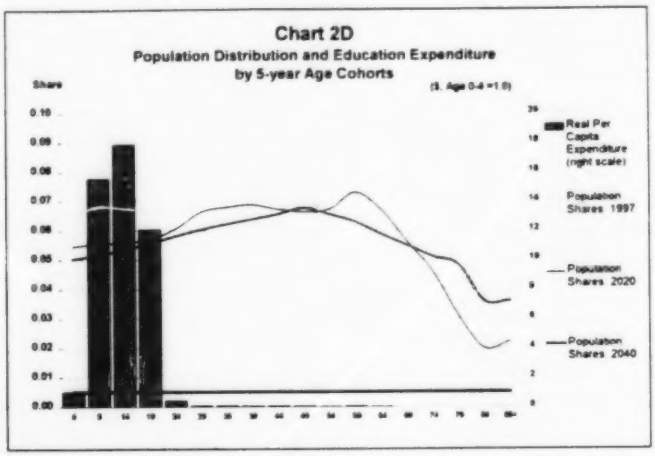


It is important to note that ageing pressures will emerge slowly (Chart 2C). Over the 65 year period between 1975 and 2040, ageing pressures are expected to add less than one percentage point per year to the annual growth in health expenditures. Today, growth due to ageing amounts to only 0.8 percentage points. Moreover, ageing pressures are expected to remain at, or just below the average of the past 25 years until 2005. At this time, as the baby-boomers begin to move into the higher health spending categories, ageing pressures will increase to a maximum of 1.5 percentage points (in 2012), and remain above average until 2030. Thereafter, ageing pressures will decrease in importance until 2040 where ageing is expected to contribute only 0.2 percentage points to annual health expenditure growth.



If a government wishes to maintain a consistent level of programs and services through time, it must maintain a constant level of real per capita expenditure on each cohort. Thus, as the population ages, government expenditure must increase. This direct cost pressure will be compounded because the life expectancy of Canadians is continually increasing. Therefore the period over which individuals absorb public goods and services most intensively is lengthening.

Demographic forces will provide some cost relief in programs such as education, where the relative size of the program's target population (i.e. those age cohorts who benefit the most) will shrink (Chart 2D). However, it is unlikely that relief from this source will completely offset the impact of other forces. Public spending on education in 1999-00 will average less than half that on health and the old age security program; about $37 billion, versus $56 and $24 billion, respectively. Meanwhile, the predicted rise in the elderly population share is over four times as large as the expected decline in the youth share.



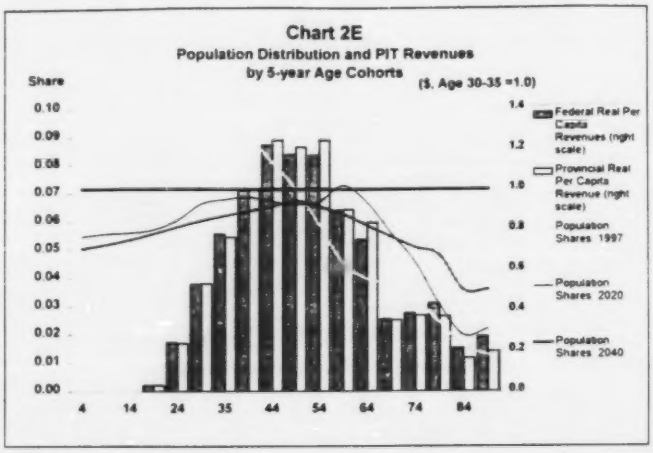
2.2 *Direct Impact of Demographics on Government Revenue*

Demographic forces may also affect the government budget balance via revenue yields. However, these impacts rest more on the supply-side effects of ageing on the macro economy,

and on the private consumption and savings decisions of individuals as they age. As the magnitude and direction of these effects are more uncertain, so too are the impacts on revenue yields.

An ageing population will impact the supply side of the economy by slowing the growth of the labour force in two ways: i) a lower fertility rate will slow the inflow of younger people into the labour force source population; and, ii) older and soon to be more populous age cohorts tend to have weaker labour force attachment, and therefore the participation rate of the labour force as a whole may decline. As growth of one of the primary production inputs slows, so too will the pace of economic growth. As the growth rate of total economic activity slows, so too would income and consumption growth. This could feed into the whole spectrum of income and consumption taxes and slow government revenue growth to rates below those experienced historically.

Another mechanism by which demographic forces may influence government revenue yields comes through typical lifetime income and consumption patterns, and their implications given the predominance of the baby-boom generation. As the baby-boom generation ages and moves through these typical lifetime patterns, various tax revenue sources could be affected differently. Lifetime earnings patterns are such that income tends to rise through an individual's earlier working years, peak in the middle-to-late working years, and decline toward the retirement years. The personal income tax yields of individual age cohorts mirror this profile, rising steadily but then falling again, from the earlier to later working years (Chart 2E):[4]



The personal income tax system may yield less revenue in future years due to the maturing earnings profile of the individuals that make up the tax base. This effect would be amplified by the progressivity of the personal income tax system, with lower tax rates for individuals earning lower levels of income.

An ageing population may also have implications for consumption tax yields. Consumption patterns tend to follow lifetime earnings patterns. Household consumption data show that average consumption levels increase from the earlier to mid-life years, and then

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[4] The use of province-specific revenue yields by cohort causes the federal and aggregate provincial-territorial yields to differ marginally.

decreases toward the retirement years. If this consumption pattern is maintained, then consumption tax yields may also fall as the population structure matures. This effect would be exaggerated by the system of tax credits, such as those for the GST. Such credits are available only to those with lower incomes (generally the young and the old). Relatively more retired people with relatively lower earned incomes would increase tax credits and lower tax yields.

2.3 Some Possible Offsetting Factors

Notwithstanding the negative factors that could affect government revenue yields, other factors also exist which may offset, perhaps considerably, the above mentioned fiscal pressures. Slower labour force growth may restrain output growth. However, it may also boost the economy-wide capital-to-labour ratio. A higher capital-to-labour ratio would boost labour productivity and mitigate the slowdown of output growth (though this would be a longer-run effect). In addition, if labour is paid its marginal product, real wages would rise, which would in turn strengthen workers' attachment to the labour force, boosting participation rates, and further offsetting any growth slowdown. Moreover, predictions of declining labour force participation rates are predicated on the assumption that the participation rates of today's elderly age-cohorts (65 and over) will be adopted by individuals currently in younger cohorts, as they age. It is possible however that the baby-boom generation will retain its current higher participation rates as they move in to the 65 and over age cohorts. This would mitigate any decline in labour force and GDP growth.

Immigration can also affect labour force growth. If immigration is driven by economic imperatives, then a significant future slowdown in GDP growth could be offset somewhat by increases in immigration. However, maintaining current labour force population growth rates would require some 300,000 new immigrants per year by the 2020s. Furthermore, this assumes the emphasis would be on economic-class rather than family-class immigrants, and that their integration into the labour market would be quick and relatively costless.

Finally, one potentially very important offset to government revenue loss exists in the regime of tax sheltered private pension plans. Currently, revenue losses to the government associated with tax deductions on contributions to private pension plans, and the fact that earnings in those plans are not taxable, exceed revenue gains from the taxation of withdrawals. In 1998, the revenue loss to governments as a result of these plans was on the order of 3.5% of GDP. The number of people in the baby-boom generation entering retirement and making taxable withdrawals will be relatively large compared to those individuals remaining in the labour force who are still making tax-deductible contributions. While this may not lead to a positive revenue gain with respect to GDP, the current loss of 3.5% could drop substantially.

3. Methodology and Assumptions

The following section describes the method used to extrapolate government revenue and expenditure, as well as the demographic, economic and fiscal policy assumptions upon which extrapolations are based.

3.1 Extrapolating Revenue and Expenditure.

The goal of the simulations is to replicate, in the context of an ageing population, the long-run *structural* evolution of government revenue and expenditure. The potential for public dissaving is then gauged under a range of fiscal policy scenarios. Government revenue and expenditure are modelled as a function of their structural determinants, using an accounting model and a set of economic and demographic assumptions (see Appendix A). A 'spending enrichment' variable is also included to capture discretionary fiscal policy not related to general inflation, health inflation, population growth, changes in population age-composition or other explanatory variables.[5]

Of the likely economic and fiscal impacts of population ageing discussed in the previous section, the following are captured by the model:

- Expenditure on education, social services, old age security and employment insurance is absorbed more intensively – and in the latter two exclusively – by specific age cohorts. Changes in the total population representation of these target groups are captured in the extrapolations. Similarly, the changing representation of employment insurance contributors is also captured by the extrapolations.

- The non-uniform absorption of goods and services across age cohorts is captured in extrapolations of health, education and social services expenditure.

- The supply-side effects of demographic change on total output are captured by simulating GDP using a Cobb-Douglas production function; slower labour force growth and a declining labour force participation rate both result in slower total output growth.

- The effect of non-uniform contribution to tax bases across age cohorts is captured in projections of personal income tax and retail sales tax.

The only effects discussed but not explicitly captured by the model are:

- There is no assumed change in the participation rate. Future cohorts aged 60-65 are assumed to have the same labour force attachment as current workers.

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5 For further details on the methodology see: (1992) *Federal-Provincial Study on the Cost of Government and Expenditure Management*. Department of Finance. mimeo.

- Immigration is not assumed to change after 2016. Levels are fixed at 250,000 persons per year.

- Neither the potential for an income tax revenue yield smoothing effect from the maturing of the RRSP system nor the effect of demographics on the RRSP are captured in the model.

As with any modelling framework, the necessary abstractions imply some caveats. The primary caution here is that the model is 'static'. This means, for example, that GDP growth is divorced from changes in government revenue, expenditure and debt – there are no dynamic feedback effects. In reality, there would be at least some interaction between these variables. There is also no endogenised fiscal-authority response. Once a fiscal plan is set, public finances evolve without intervention from the fiscal authority, even if the result is a growing fiscal imbalance, positive or negative. The demographic effects captured by the projections are not exhaustive, but represent the largest and most readily apparent effects. Finally, the model is meant only to mimic the long-run structural behaviour of government revenue and expenditure, and only approximates the year-over-year variations in budget balances.

3.2 Demographic Assumptions

The demographic projections are from the set of four population projections published by Statistics Canada. Statistics Canada publishes (semi-regularly) a set of population projections, representing three population scenarios, 'high', 'medium', and 'low' growth. The 'medium' growth scenario is used here.[6] Detailed provincial and territorial population projections are provided through 2016. Projections are extended through 2041 by keeping the underlying fertility, mortality and migration assumptions constant at the levels reached in 2016. As of 2016, these are (Charts 3 to 6):

- Fertility: 1.7 births per woman of child-bearing age;

- Life expectancy at birth: 78.5 years for males and 84.0 years for females;

- Immigration: 250,000 persons per year; and,

- Internal migration: 'medium' scenario – British Columbia and Ontario the largest net recipients of migrants.

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6 Statistics Canada, catalogue 91-520.

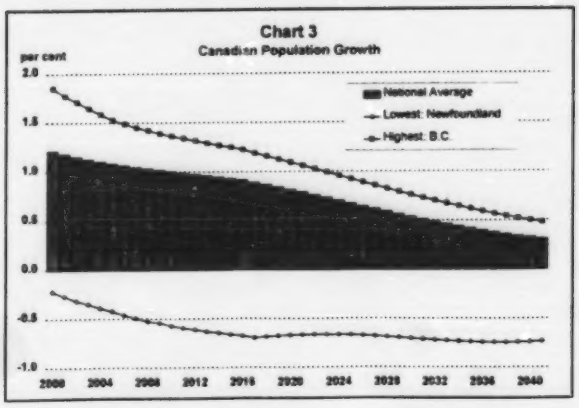


Chart 3
Canadian Population Growth
per cent
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
National Average
Lowest: Newfoundland
Highest: B.C
2000
2004
2008
2012
2016
2020
2024
2028
2032
2036
2040

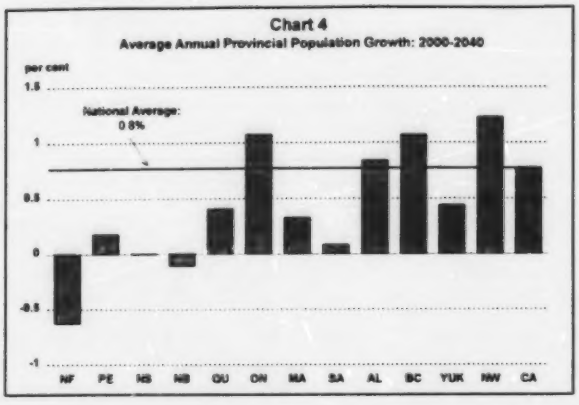


Chart 4
Average Annual Provincial Population Growth: 2000-2040
per cent
1.5
1
0.5
0
-0.5
-1
National Average:
0.8%
NF
PE
NS
NB
QU
ON
MA
SA
AL
BC
YUK
NW
CA

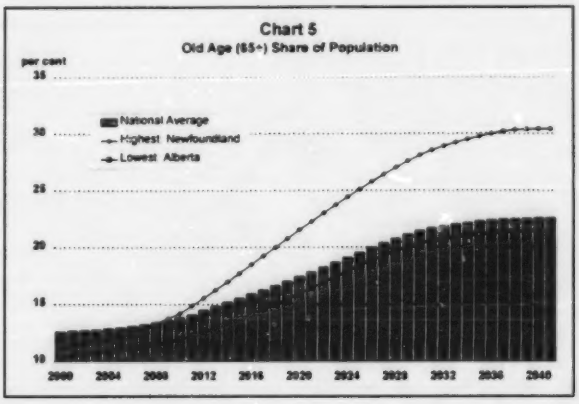
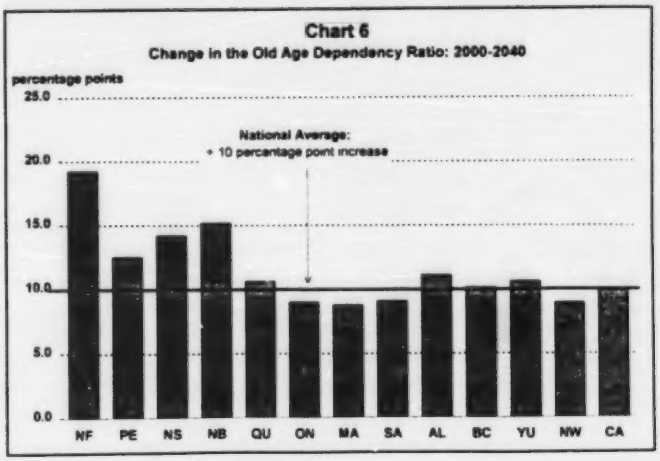


Chart 5
Old Age (65+) Share of Population
per cent
35
30
25
20
15
10
National Average
Highest: Newfoundland
Lowest: Alberta
2000
2004
2008
2012
2016
2020
2024
2028
2032
2036
2040



The two most important expected changes in Canadian demographic trends are clearly evident in the population projections. Due to declining fertility rates and the ageing of the baby-boom generation, national population growth is projected to slow from about 1.2 per cent currently to just 0.3 per cent by 2040. The share of the population aged sixty-five and over is projected to soar almost 80 per cent, from 12.6 to 22.6 per cent, over the same period

Significant differences in demographic trends are also expected among provinces and territories. For example, the Atlantic provinces are expected to have lower population growth rates than most other jurisdictions. At the same time, they are expected to have above average increases in their old-age population shares. Overall population growth and ageing are also affected by net out-migration in the Atlantic provinces. Because migrants tend to be young, the 'natural' population ageing process, driven by fertility and mortality rates, is accelerated by the departure of those younger aged individuals.

Ontario and British Columbia, meanwhile, experience the opposite effects. As net-recipients of internal migrants, their population growth rates are increased and aggregate ageing in these provinces is mitigated.

3.3 Economic Assumptions

Economic assumptions through the near term are consistent with those of the February 1999 federal budget. Post-2000, assumptions are from the Department of Finance long run projection model. The major national economic assumptions are summarised in Table I below (Appendix C).[7]

Table I.
Economic Assumptions

	1998	2000	2020	2040
Real GDP Growth	1.8	2.1	1.4	0.8
per capita	0.6	0.9	0.6	0.5
GDP Inflation	0.7	1.7	1.7	1.7
CPI Inflation	1.4	1.7	1.7	1.7
Labour Force Growth	1.9	1.3	0.2	0.3
Participation Rate	65.5	65.5	60.9	58.2
Unemployment Rate	8.2	8.5	6.4	5.9
Labour Productivity	-0.2	1.1	1.1	0.6
3 Month T-Bill	4.6	4.8	4.8	4.8
10 Yr. + Government Bond	6.7	6.7	6.8	6.8

3.4 Fiscal Policy Assumptions

The starting point for the simulations is the 1999 federal budget for the federal government, and the June 1999 public accounts for provincial-territorial governments. Provincial-territorial simulations begin in 2000-01, while federal simulations start one year later, in 2001-02. Simulations attempt to reflect as accurately as possible the stated near-term policy objectives of each provincial-territorial jurisdiction. To that end, where the June 1999 public accounts contained revenue or expenditure data beyond the 1999-2000 fiscal year, these data were included. Where the June 1999 public accounts contained only a medium-term deficit or surplus target for a jurisdiction, extrapolated revenue and expenditure were adjusted proportionally such that the stated target was met.

3.4.1 Federal Basecase Scenario

To help highlight the impact of ageing pressures, simulations were conducted on a shock versus control basis. The major assumptions of the federal control or basecase scenario are

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7 An earlier version of the long-term planning assumptions were presented and discussed at the conference 'Fiscal Targets and Economic Growth' held at Queen's University, September 5-6, 1997. Among the long-run projections presented, those of the Department of Finance were considered conservative. For further details, see: Goldstein, A (1997) "A Comparison of Long-term Canadian Economic Projections." In *Fiscal Targets and Economic Growth*, T. Courchene and T. Wilson (eds.). Kingston: John Deutsch Institute, 1997.

detailed in Table II below (this represents a *status quo* policy regime that results in building budget surpluses and a declining debt-ratio).

Table II.
Federal Basecase

Expenditure	
Old Age Security[8]	Current OAS-GIS system retained; zero growth in average real benefits.
EI Expenditure	Projected as a function of inflation, population growth, and population compositional change. Real benefit growth equal to labour productivity growth.
Provincial Transfers	CHST entitlement grows with nominal GDP.
All other Program Expenditure	Real per capita expenditure maintained at the 2000-01 level.
Revenue	
EI Revenue	Grows with inflation, population compositional change, labour force productivity, and the growth of labour force employment.
PIT	Projected as a function of inflation, population growth, population compositional change and labour productivity.
CIT	Grows with nominal GDP.
RST	Projected as a function of inflation, population growth, population compositional change and labour productivity.
Other Revenue	Projected as a declining share of GDP (declines at a rate of about 2% per year).

3.4.2 Provincial-Territorial Basecase Scenario

The basecase projection for the provinces and territories is a *status quo* policy environment where expenditure keeps pace with inflation, population growth and changes in the age composition of the population, but where there are no *discretionary* expenditure changes. The projections for health services also include 'health inflation' (0.4 percentage points over and above the general inflation rate) to reflect the fact that inflation in health services has historically been higher than general inflation as measured by the consumer price index. In other words, real per capita expenditure by age group is held fixed at current levels in the basecase (and as noted above, CHST transfers are linked to GDP growth only). This scenario provides a reference point that highlights the interaction between policy variables and demographic forces, as discretionary fiscal policy action is introduced.

[8] The Canada and Québec Pension Plans are off-budget items and are therefore not considered here.

Table III. Provincial-Territorial Basecase	
Expenditure	
Health	Projected as a function of general inflation, health inflation, population growth and population compositional change.
Education	Projected as a function of inflation, population growth and population compositional change. Program generosity grows at approx. the 1974-92 rate, 1% per year.
Social Services	Projected as a function of inflation, population growth and population compositional change.
Other Program Expenditure	Real per capita expenditure maintained at the 1999-00 level.
Revenue	
PIT[9]	Projected as a function of inflation, population growth, population compositional change and labour productivity.
CIT	Revenue grows with nominal GDP.
RST	Projected as a function of inflation, population growth, population compositional change and labour productivity.
Other Own-Source Revenue	Revenue projected according to provincial/territorial historical elasticities.
CHST	Transfer entitlement grows with nominal GDP.
Equalisation	Per capita entitlement based on historical growth rates.

3.4.3 Federal and Provincial-Territorial Shock: Spending Scenarios and Fiscal Regimes

The basecase scenario is used as a basis for comparison against three spending scenarios. In these three spending scenarios, real per capita provincial health expenditures are enriched by 0, 1 or 2 per cent respectively while federal transfers are assumed to grow in line with provincial health care expenditures after 2010 rather than with nominal GDP[10]. As such, the federal government is assumed to maintain fixed its share of health care funding after 2010. Therefore, while only CHST expenditure varies between federal scenarios, both health spending and

[9] See Appendix B for a note on the interaction between federal and provincial-territorial revenue sources.

[10] The modelling of transfers is also described in more detail in Appendix B.

transfers received vary between provincial-territorial scenarios. All other discretionary provincial-territorial revenue and expenditure assumptions remain the same in each spending scenario.

The purpose of the spending scenarios is to examine the ability of each jurisdiction to manage population ageing and the increases in health spending which may be necessary in the coming years. The basecase and three spending scenarios are then examined within several fiscal policy regimes. Each policy regime differs only in its allocation of any budgetary surpluses. Surpluses are allocated according to three policy objectives: spending increases, tax relief and debt reduction:

- **Tight fiscal regime**: surplus allocated to debt reduction only. Debt-to-GDP ratios fall or rise without bound.

- **Loose fiscal regime**: surplus allocated in equal proportions to spending increases and tax relief. No debt reduction is undertaken.

- **Middle fiscal regime**: surpluses are allocated in equal proportions to spending increases, tax relief and debt reduction. This regime assumes that jurisdictions undertake debt reduction to achieve a specific debt ratio target (assumed to be 0%, 10% or 20%). Therefore, once a target is reached, any remaining surpluses are allocated equally to spending increases and tax relief.

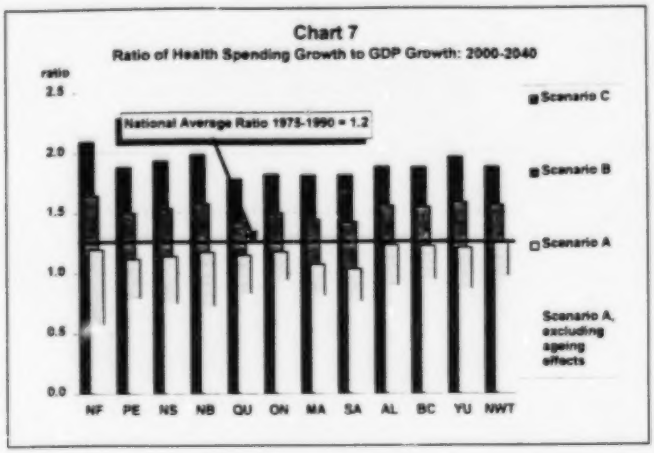
The purpose of the fiscal regimes is to examine the manageability of population ageing under differing assumptions regarding the division of any fiscal dividends. For example, population ageing may be manageable under the assumption that all surpluses are allocated to debt reduction. However, it is also important to know how different jurisdictions fare if they decide to allocate more of their surpluses to further discretionary spending and tax reductions. The three spending scenarios and fiscal regimes are summarised in Table IV. By examining the basecase and alternative spending scenarios under various fiscal regimes, it is possible to examine how decisions concerning the division of the fiscal dividend could affect future outcomes in the context of population ageing.

Table IV: Detailed Summary of Simulations

Fiscal Regime	Scenario	Variable		Federal Government surplus allocated to debt reduction only				Provincial Governments surplus allocated to debt reduction only			
		CHST *Federal and Provincial Gov'ts*	Health Spending *Provincial Gov't*	*Timing*	*Taxes* 0	*Spending* 0	*Debt Reduction* 1	*Timing*	*Taxes* 0	*Spending* 0	*Debt Reduction* 1
Surplus allocated to debt reduction (tight fiscal stance)	Basecase	linked to nominal GDP growth	0% enrichment								
	Scenario A	linked to 0% enrichment in aggregate health spending	0% enrichment								
	Scenario B	linked to 1% enrichment in aggregate health spending	1% enrichment								
	Scenario C	linked to 2% enrichment in aggregate health spending	2% enrichment								
Fiscal Regime	**Scenario**	**Variable**		**Federal Government** Debt Ratio Target: 20%, 10%, 0%				**Provincial Governments** Debt Ratio Target: 20%, 10%, 0%			
		CHST *Federal and Provincial Gov'ts*	Health Spending *Provincial Gov't*	*Timing*	*Taxes*	*Spending*	*Debt Reduction*	*Timing*	*Taxes*	*Spending*	*Debt Reduction*
Surplus allocated according to debt ratio targets (balanced fiscal stance)	Basecase	linked to nominal GDP growth	0% enrichment	pre-target post-target	1/3 1/2	1/3 1/2	1/3	pre-target post-target	1/3 1/2	1/3 1/2	1/3
	Scenario A	linked to 0% enrichment in aggregate health spending	0% enrichment								
	Scenario B	linked to 1% enrichment in aggregate health spending	1% enrichment								
	Scenario C	linked to 2% enrichment in aggregate health spending	2% enrichment								
Fiscal Regime	**Scenario**	**Variable**		**Federal Government** no surplus allocated to debt reduction				**Provincial Governments** no surplus allocated to debt reduction			
		CHST *Federal and Provincial Gov'ts*	Health Spending *Provincial Gov't*	*Timing*	*Taxes* 1/2	*Spending* 1/2	*Debt Reduction* 0	*Timing*	*Taxes* 1/2	*Spending* 1/2	*Debt Reduction* 0
Surplus allocated to spending and taxation (loose fiscal stance)	Basecase	linked to nominal GDP growth	0% enrichment								
	Scenario A	linked to 0% enrichment in aggregate health spending	0% enrichment								
	Scenario B	linked to 1% enrichment in aggregate health spending	1% enrichment								
	Scenario C	linked to 2% enrichment in aggregate health spending	2% enrichment								

3.5 Health Expenditure Assumptions in Perspective

As the main factor distinguishing the three provincial simulation scenarios – and one of the primary mechanisms transmitting demographic pressures into government fiscal balances – it is informative to examine the assumptions for health spending in an historical context. The ratio of health spending growth to GDP growth is shown in Chart 7. Under scenario A, health spending grows with population growth, population compositional change and inflation. Scenario B and C include further enrichments of 1% and 2% per year, respectively.



Under scenario A, the growth of health spending relative to the growth of the economy over the simulation period is slightly below that of the 1975-90 period. In the absence of population ageing, the scenario A ratio of health spending growth to GDP growth would average only 0.8. The difference between the two series represents the additional growth in expenditure necessary to maintain real per capita levels of health spending in the face of demographic change over the simulation period. Under scenarios B and C health spending grows much faster than the historical average.

The implications of the three scenarios in terms of real per capita expenditure, a more appropriate indicator of the level or quantity of health services provided, are shown in Chart 8.[11] The impact on health care of the recent period of fiscal restraint is readily evident. Real per capita health spending peaked in the 1991-92 fiscal year, but following years of budget consolidation, had fallen 12.4 per cent by 1998-99. Real per capita spending in 1998-99 was equivalent to the 1986-87 level.

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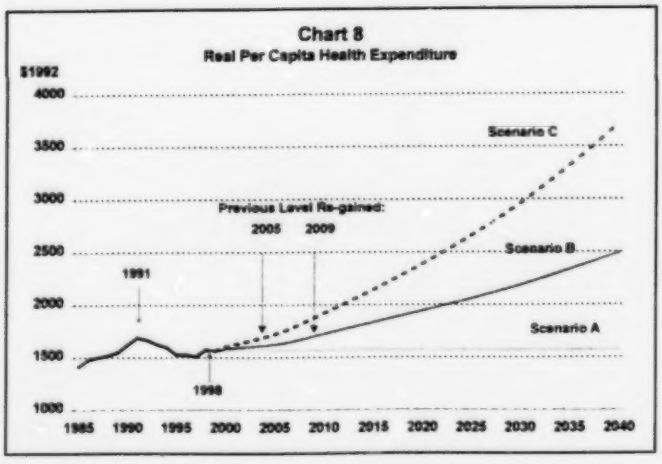
11 Maintaining the same level of real expenditure on each age cohort.



Over the course of the simulation period, the three scenarios represent a wide range of health program 'enrichment'. In Scenario C, where real per capita health spending is enriched at a rate of 2% per year, it takes until 2005-06 for health expenditure to regain its previous peak. In Scenario B which includes a 1% enrichment rate, the pre-consolidation level of real per capita health expenditure is restored in 2009-10. In Scenario A, there is no enrichment and expenditure never regains its previous peak, since by construction, it remains fixed at its current level. In Scenarios B and C, where there is a provision for expenditure increases above and beyond those needed to keep pace with inflation and demographic change, the level of real per capita spending over the simulation period climbs significantly above its 1991-92 peak level.

The above chart shows varying levels of real per capita health expenditure included as technical assumptions in the model. These assumptions do not imply that the real per capita levels considered in this paper represent *adequate* levels of future health care services. This issue is beyond the scope of our paper.

The three health spending scenarios are broadly consistent with history. Table V below breaks the average growth in health expenditures over the past 25 years into contributions from inflation, overall population growth, the changing age structure of the population and a residual factor called 'enrichment'. Average yearly enrichment was 1.1 per cent during the late seventies, 3.2 per cent during the 1980s and less than one percent during the 1990s. Thus, scenario B (1% enrichment) reflects health spending growth during the late seventies and the 1990s while scenario C (2% enrichment) reflects the average over the 25 year period. The highest growth scenario of 2 per cent per year is more than double the projected rate of productivity growth (0.9) over the forecast period.

Table V. Average Yearly Growth in Health Expenditures

	1975-79*	1980-89*	1990-94*	1995-2000**	*Average 1975-2000*
Nominal expenditure growth	**13.6**	**11.2**	**4.4**	**3.8**	**8.3**
inflation (general and health)	9.3	6.1	1.6	1.1	4.4
Real health expenditure growth	**4.3**	**5.2**	**2.8**	**2.7**	**3.9**
population growth	2.1	1.1	1.4	1.4	1.3
Real Per Capita	**2.2**	**4.0**	**1.4**	**1.4**	**2.6**
of which:					
population compositional change	1.2	0.8	0.6	0.9	0.8
enrichment	1.1	3.2	0.8	0.5	1.8

*Source: National Health Expenditures in Canada, 1975-1994

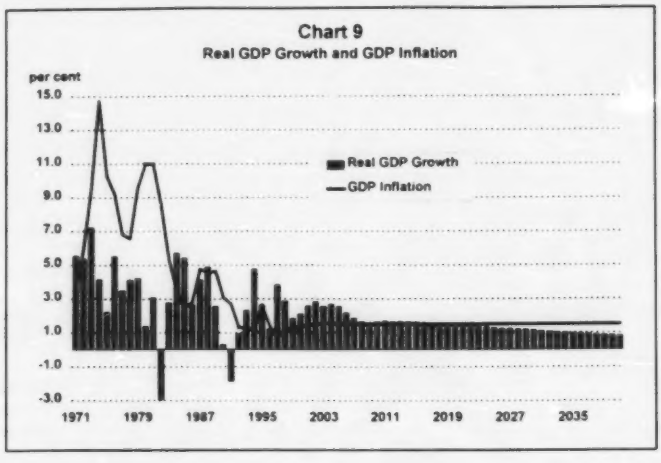
**Source: 1995-1998 figures from Federal and Provincial Public Accounts 1988-89 to 1999-2000
1999 and 2000 are provicial estimates from Public Accounts if listed, otherwise
figures are projected from "*Public Finance Implications of Population Ageing*"

4. Quantifying the Impact of Demographic Change

The following section presents estimates of some of the more important implications of population ageing discussed Section 2. These estimates are then incorporated into the federal and provincial-territorial debt simulations of Section 5.

4.1 Impact on Output Growth

The demographic changes postulated in the population projections have significant implications for total income growth. This, in turn, has significant implications for the tax bases of many revenue categories, as well as the amount of nominal debt that a jurisdiction may carry. The effect of demographic changes on forecast GDP can be seen below (Chart 9). Annual real GDP growth over the simulation period is predicted to average just 1.5 per cent. This is less than one-third the annual rate posted during the 1970s (4.6 per cent), and about one-half the rate of the 1980s (2.9 per cent).



As with population projections, significant differences in predicted GDP growth profiles exist among provinces and territories (Chart 10)[12]. Due to their very low predicted population growth rates, the Atlantic provinces are forecast to post the lowest annual average real growth rates, ranging between 0.6 per cent (Newfoundland) and 1.0 per cent (Prince Edward Island). Ontario and British Columbia, meanwhile, benefit from their higher population growth rates, and are expected post annual real GDP growth rates of 1.6 and 1.5 per cent, respectively.

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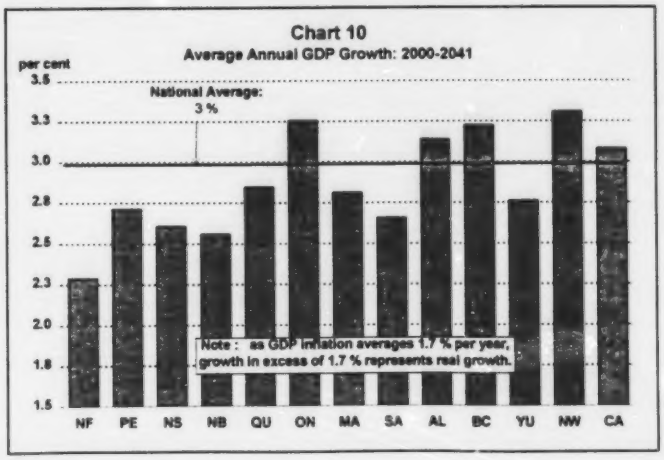
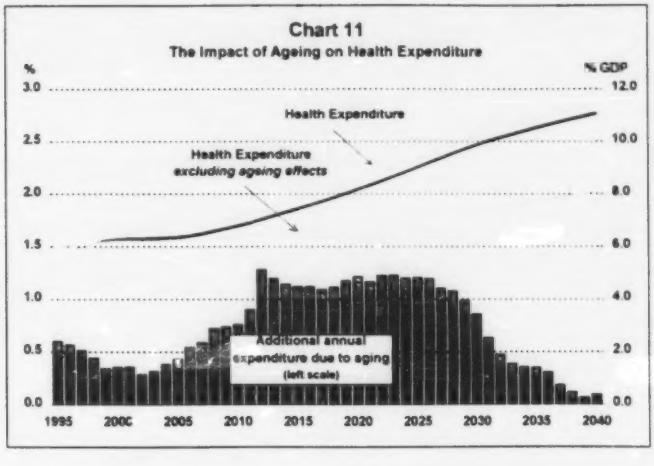
12 A GDP forecast for individual provinces and territories was determined relative to total national GDP. This was done on the basis of differences in labour force source population growth rates. For simplification, it was assumed all other factors that affect GDP growth – changes in the participation rate, capital stock growth, labour and capital income shares, GDP inflation*et cetera* – evolve identically across provinces (Appendix A).



4.2 Impact on Expenditure

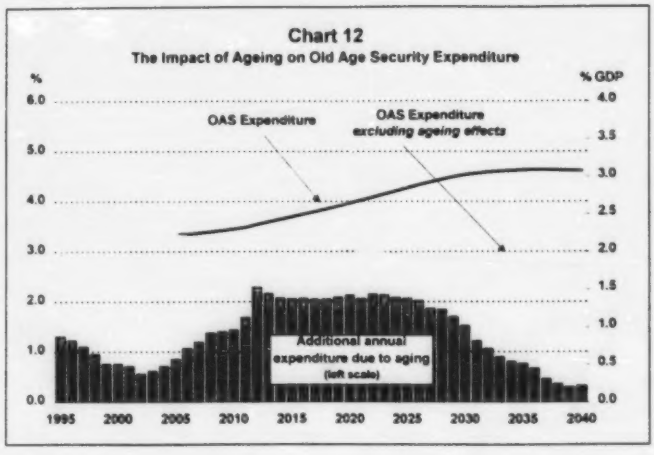
There are three main channels through which demographics may affect program expenditure: i) a program's target population may increase or decrease; ii) different age cohorts absorb public goods at different rates; and iii) because of decreasing mortality, individuals are collecting goods or services for lengthening periods of time. These demographic pressures will be most pronounced in spending on health, old age security and education.

As discussed in Section 3, future increments in real health expenditure will be absorbed very differently than in the past. Previously, at least some part of any increase translated into advances in the quality or quantity of health care; over the coming years, relatively more real resources will be absorbed in providing a constant quality of care to an older and more costly population. The estimated cost of providing health services to an ageing population is shown below (Chart 11). The health spending profile of the 'middle enrichment' scenario (B) is plotted along with the expenditure profile that results when the total population share of each age cohort remains fixed.



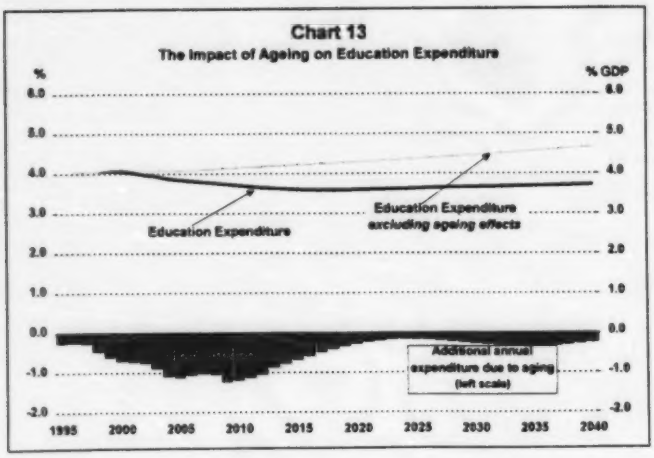
The impact of ageing is slow to emerge but significant. Starting in about the year 2005, population ageing adds ever increasing pressure to the total health care bill. This pressure peaks in 2012, when ageing adds about 1.3 per cent per year to total expenditure. This pressure lasts for about eighteen years before subsiding as population shares stabilise. On an annual basis, the incremental cost pressure of ageing on health expenditure is not dramatic. However, by the year 2040, this pressure boosts expenditure by the equivalent of 3 per cent of GDP, about $43 billion in today's terms, compared to what it would have been in the absence of ageing.

A similar effect can be seen in old age security expenditure. Chart 12 plots old age security expenditure both with and without ageing effects. Abstracting from the ageing phenomenon, old age security spending would decline slowly from its current level to below 2 per cent of GDP by 2026. In reality, ageing pressures are likely to push total expenditure to about 3.1 per cent of GDP. The difference is about $21 billion in today's terms.



It is noteworthy that the cost pressures of ageing are more acute in the area of old age security than in health care. At the peak, old age security expenditure is some 70 per cent above what it would be in the absence of ageing. For health care, the comparable increase is only half as large. Higher cost pressure on old age security spending arises because the program is exclusive to the most rapidly growing segment of the population, those aged sixty-five and over. Health spending, meanwhile, is absorbed by all age cohorts, fast and slow growing, and both heavy and less intensive users. Nevertheless, because health is by far the larger expenditure area, growth in it will necessarily have bigger repercussions for public finances.

Finally, education expenditure has the potential to provide at least some offset to the above spending pressures. In the absence of ageing, it is estimated that by 2040 education expenditure would be approximately 1 per cent of GDP *higher* than it otherwise would be (Chart 13). This represents about $16 billion in today's terms.



4.3 Impact on Revenue

The effects of population ageing on revenue are less apparent and are therefore harder to quantify. However, lifetime income and lifetime consumption patterns can be used to mimic the impact of ageing on revenue yields. For example, using taxation information it is possible to construct relative personal income tax yields by 5-year age cohort. Assuming these tax yields remain relatively stable through time, the impact of ageing on personal income tax revenues can be approximated [13]

The most important result for the simulations, and for future policy planning, is that if the estimated cohort tax yield structure is maintained, there will be (all other things being equal) relatively little consequence for personal income tax yields. As the baby-boomers leave the labour market and their income starts to decline, there is an offset as subsequent generations move into their highest earnings years.[14]

For the federal government, PIT revenues are projected to be just over 2 per cent lower than they would be in the absence of ageing. This translates to only 0.2 per cent of GDP. The most significant slowdown in PIT revenue growth is likely to occur during the twenty year period from 2010 to 2030 as the share of the population in their highest earning years declines substantially (Chart 14A).

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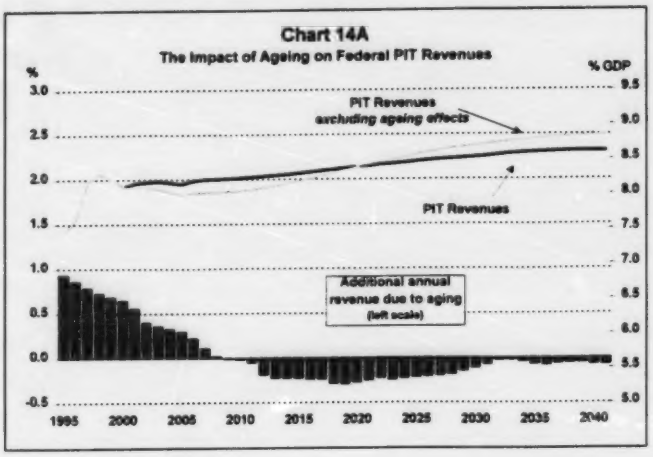
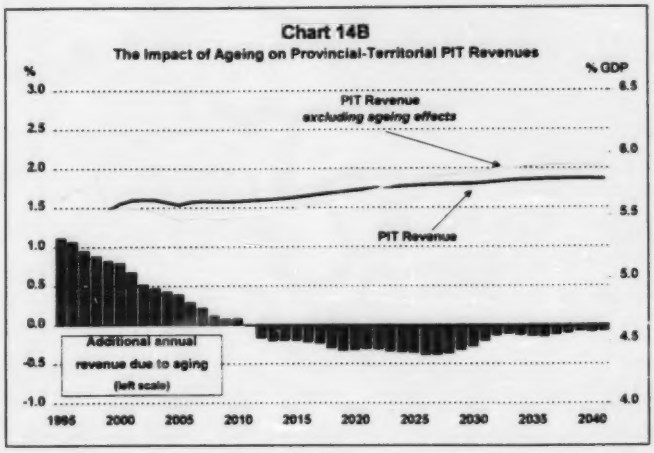
13 A cohort analysis would be a preferable method for modelling these impacts, as it would allow for possible behavioural effects.

14 A similar exercise for retail sales taxes (based on age-related consumption patterns) results in a similar conclusion – it appears there will be (all other things equal) relatively little consequence for tax revenues.



Provincial-territorial governments will experience a similar effect on their personal income tax yields. Projected status quo revenues of 5.9 per cent of GDP fall to 5.8 per cent as demographic effects are introduced into the simulation.

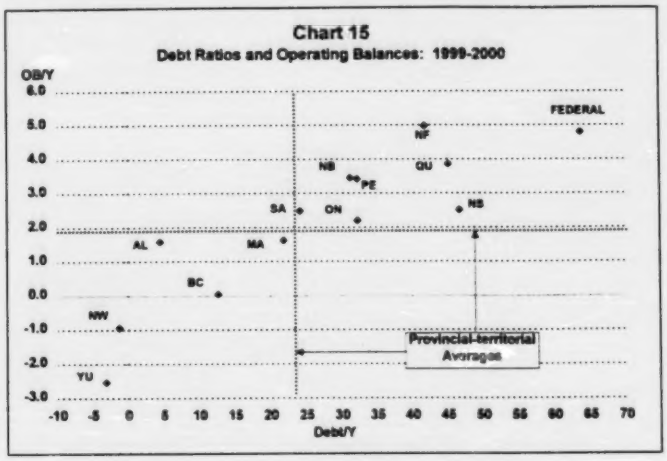


5. Implications of Demographic Change on Fiscal Positions

Before examining the debt simulations, it is interesting to briefly examine the current fiscal positions of governments (based on the 1999 federal and provincial budgets) to highlight the wide differences which exist among jurisdictions. It is also important to examine current fiscal positions because they can influence debt simulation outcomes.

5.1 Current Fiscal Positions

Operating balances and debt-ratios, as well as debt interest rates and long run GDP growth are shown below for provincial-territorial jurisdictions (Charts 15, Table VI). There is a predictable relationship between the level of debt and operating balances. Those jurisdictions with higher debt-ratios are obliged to post higher operating balances in order to obtain balanced budgets.



A less regular relationship emerges between a jurisdiction's GDP growth rate and the interest rate it must pay on its debt (Table V). The difference between these two variables captures the rate at which the growth of any outstanding debt outpaces the income base (GDP) used to sustain it.[15]

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15 One complication in simulating debt paths is that public accounts debt charges are often reported on a gross basis, while public debt is reported on a net basis (note that there is no consistent, comparable and up-to-date data set on gross provincial-territorial debt). This overestimates some of the calculated effective interest rates shown in Chart 16. However, these higher effective rates were also necessary – in the absence of sound projections of asset income – to replicate debt charge profiles consistent with those of the public accounts. In the simulations, as net government debt is eliminated, this distinction should no longer matter.

Table VI. Average GDP Growth (2000-40) and Debt Interest Rates

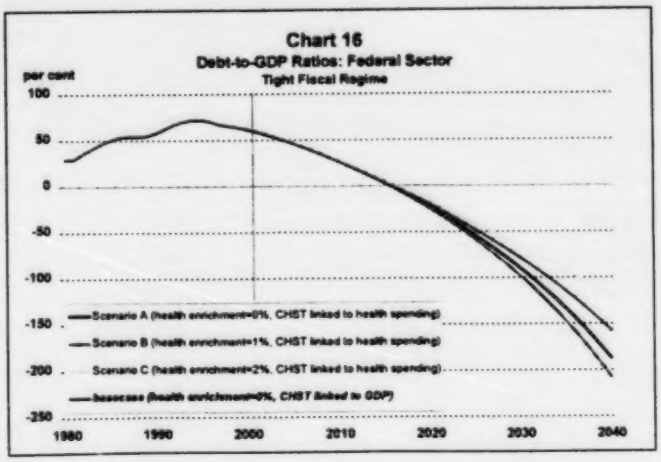
	Effective Interest Rate on Debt	Average GDP Growth 2000-40	Difference
NF	12.0	2.3	9.8
PE	10.1	2.7	7.4
NS	8.9	2.6	6.3
NB	10.8	2.6	8.2
QU	8.6	2.8	5.7
ON	8.1	3.3	4.8
MA	7.1	2.8	4.3
SA	8.4	2.7	5.7
AL	7.3	3.1	4.1
BC	7.2	3.2	4.0
YU	10.0	2.8	7.2
NW	10.0	3.3	6.7
CA	6.9	3.1	3.8

5.2 Debt-ratio Simulations

Simulated debt-to-GDP ratios for the federal government and each provincial-territorial sector are shown in the charts below[16]. The paths shown here are extrapolated assuming that all budgetary surpluses go to debt reduction (tight fiscal regime). There are several reasons for choosing to present the debt ratios under this regime. If debt-ratios begin to rise substantially under the tightest fiscal regime, they will naturally rise under all other fiscal policy regimes. As such, the charts shown provide an easy way of eliminating potentially infeasible spending scenarios. Furthermore, the level to which the debt ratio falls under the tight fiscal regime provides a *rough* indication of the amount of room available for looser fiscal regimes. Therefore, it is a starting point from which looser fiscal regimes can then be evaluated.

It is important to remember that accounting models are quite sensitive to small changes in initial positions. Therefore, small imbalances between revenues and expenditures can result in large changes in debt ratios when compounded over a 40 year simulation period. Debt paths under the middle and loose fiscal regimes are contained in Appendix D.

16 Simulations for the aggregate provincial-territorial sector cannot be presented. The shock scenarios hinge on provincial fiscal dividends which are only positive in the presence of budget surpluses, otherwise the dividend is zero. If we were to aggregate the provincial-territorial dividends, a positive dividend could be shown even when the aggregate provincial-territorial sector budget balance was negative, leading to inconsistency between the fiscal situation on an aggregate versus a disaggregate basis. If, conversely, the fiscal dividend was determined by the aggregate budget balance, the less favourable outcomes of some provinces could result in persistent aggregate provincial-territorial budget deficits which would bias the aggregate debt path towards instability. The results are therefore presented on a jurisdiction-by-jurisdiction basis to avoid the presentation of potentially misleading results.



The federal government can eliminate its net debt by the end of the simulation period; in fact, it can do so even before ageing pressures accelerate around 2020. It is evident that even in the face of demographic change, there is room for fiscal loosening.

Results are more varied for provinces and territories:

- Despite low population growth rates, and high increases in the old age dependency ratio in the Atlantic region, all jurisdictions can eliminate their net debt under the basecase spending scenario and scenario A. Newfoundland, Nova Scotia and New Brunswick experience rising debt paths under the richest spending scenario (C). [17] In many cases net debt can be eliminated before 2020.

- Both Québec and Ontario can eliminate their net debt by 2020 under the basecase and scenarios A and B. Debt paths begin to rise only under the richest spending scenario (C).

- Among Western provinces, only British Columbia shows a rising debt-to-GDP ratio. Other provinces could eliminate their net debt under all spending scenarios.

- The territories face rising debt paths under most spending scenarios. It is possible for the Yukon to eliminate its net debt under the Basecase, Scenario A and Scenario B. The Northwest Territories is unable to eliminate its net debt under any circumstance.[18]

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17 Note that if a debt ratio begins to rise under the assumption that all of the budget surplus is allocated to debt reduction, it will naturally increase under all other macro environments.

18 The results in the Northwest Territories are partially attributable to the construction of the simulation. In the simulations, CHST funding increases with health spending, but territorial funding grows with national GDP. Since the territorial grant is by far the dominant source of revenue for the Northwest Territories, revenue growth in this jurisdiction falls far short of that necessary to keep pace with ageing pressures and the rapidly growing population. Furthermore,budget deficits over the first few years of the simulation cause rapidly rising debt for a number of years.

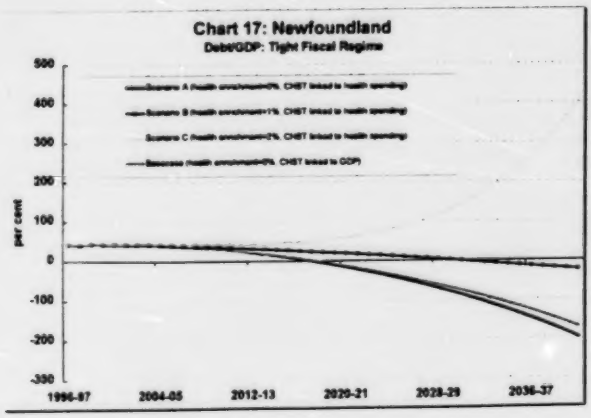


Chart 17: Newfoundland
Debt/GDP: Tight Fiscal Regime
per cent
500
400
300
200
100
0
-100
-200
-300
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

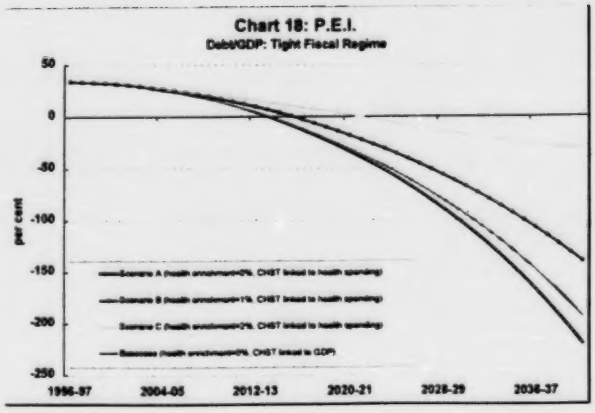


Chart 18: P.E.I.
Debt/GDP: Tight Fiscal Regime
per cent
50
0
-50
-100
-150
-200
-250
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

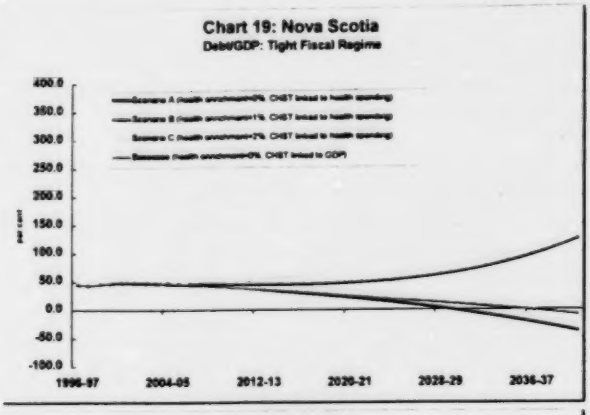


Chart 19: Nova Scotia
Debt/GDP: Tight Fiscal Regime
per cent
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

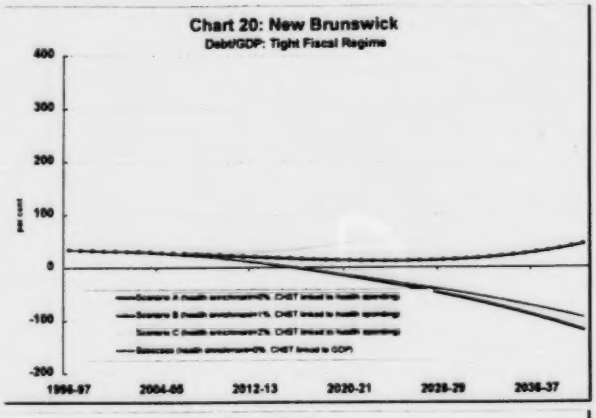


Chart 20: New Brunswick
Debt/GDP: Tight Fiscal Regime
per cent
400
300
200
100
0
-100
-200
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

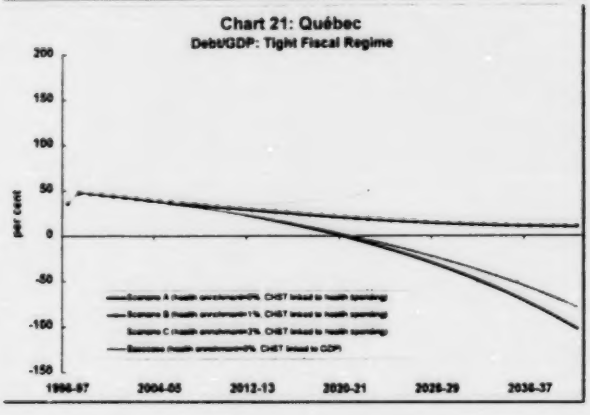


Chart 21: Québec
Debt/GDP: Tight Fiscal Regime
per cent
200
150
100
50
0
-50
-150
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

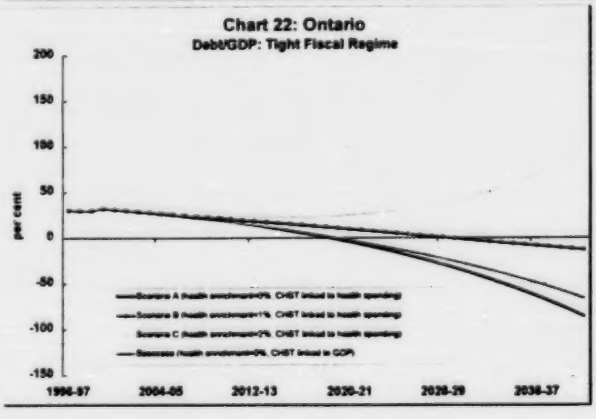
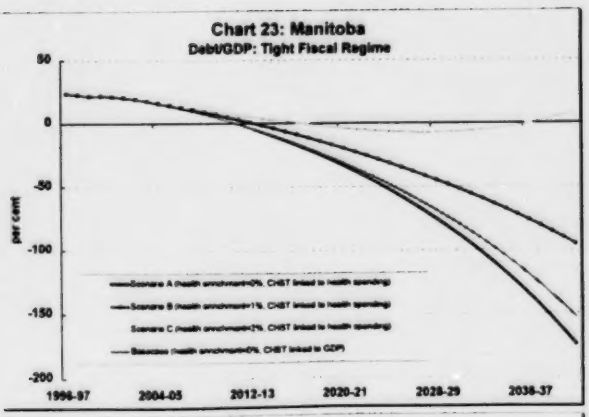
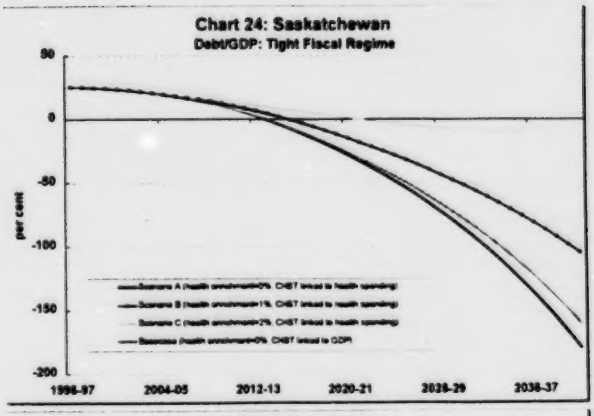
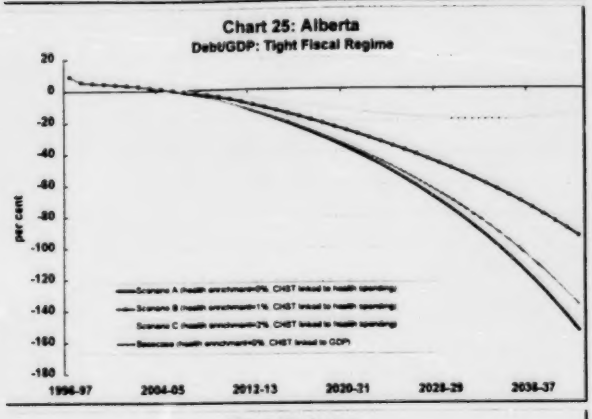
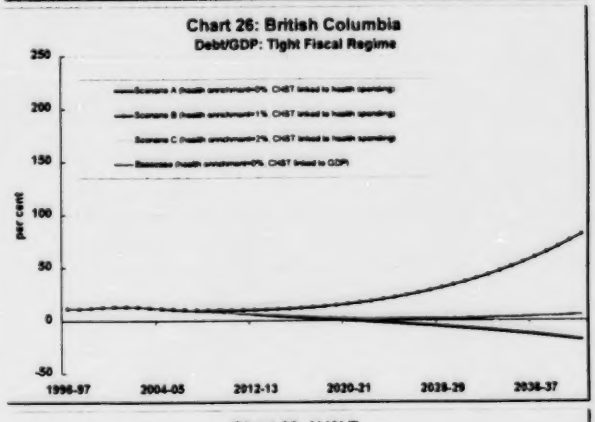


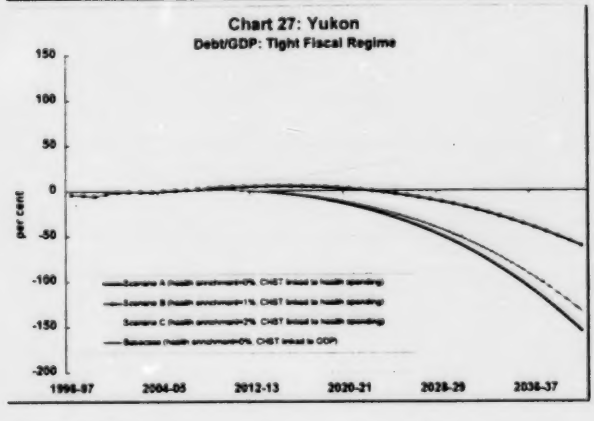
Chart 22: Ontario
Debt/GDP: Tight Fiscal Regime
per cent
200
150
100
50
0
-50
-100
-150
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

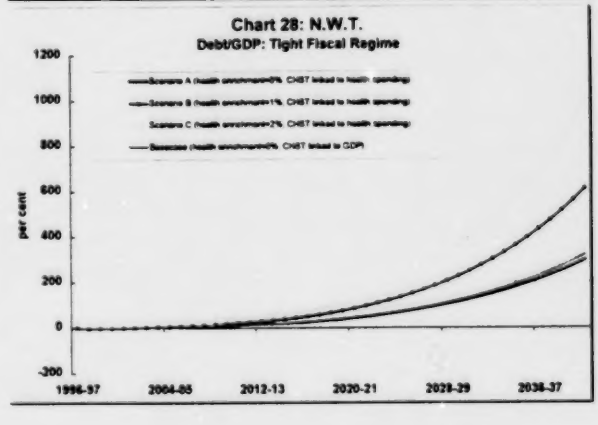












In summary, all but 2 jurisdictions (British Columbia and the Northwest Territories) can eliminate their net debt under both the basecase and Scenario A. This is an important result because the control scenario, though ruling out real per capita spending increases, includes the expected impacts of population ageing.[19] Furthermore, under Scenario B, when health spending

[19] The magnitude of the net asset or debt positions shown, while in some cases large, primarily reflects the impact of compounding over an extended period of time. Large net assets or debts can occur when there is only a relatively minor, but ongoing, difference between revenue and expenditure.

is enriched by 1% per year, 7 jurisdictions (Newfoundland, PEI, Ontario, Manitoba, Saskatchewan, Alberta and the Yukon) can eliminate their net debt by the end of the simulation period, while 3 jurisdictions (Prince Edward Island, Alberta and Saskatchewan) eliminate their net debt even if health spending is enriched at a rate of 2% per year. It is also important to note that under most scenarios, debt loads can be reduced considerably by 2020, about 10 years after ageing pressures begin to accelerate.

5.3 Other Fiscal Policy Regimes

Table VII provides debt-to-GDP ratios at the end of the simulation period for each spending scenario under each fiscal regime. The table also presents the year in which any debt ratio target would be met under the middle fiscal regime. For example, suppose Saskatchewan chooses to increase health spending by 1% per year over and above that needed to respond to inflation, population growth and demographic pressures (Scenario B). They then wish to examine the implications of this choice under various fiscal regimes. If they decide to follow a tight fiscal regime, they could reach a debt ratio of –105% (line 3). However, if they decide to pursue a middle fiscal regime and target a debt ratio of 10%, they could achieve this target by 2017-18 (line 17). In this way, it is possible to view the implications of specific fiscal environments and spending scenarios on debt-ratios. The full debt-paths are contained in Appendix D.

Under a loose fiscal regime, most jurisdictions can achieve debt ratios below 18% under the basecase spending scenario (line 29) and spending scenario A (line 30). Indeed, even if health spending were to increase by 1% per year (scenario B), 6 jurisdictions could reach debt ratios below 18% (line 31). Only in the richest spending scenario, where health spending is enriched at 2% per year, does a loose fiscal environment prevent a continuous downward trend in the debt-to-GDP ratio for all jurisdictions (line 32).

The middle fiscal regime is perhaps the most realistic. Under this regime 1/3 of any fiscal dividend is applied to each of spending increases, tax relief and debt reduction. It is also assumed that regions are targeting a specific debt ratio. Suppose all jurisdictions are targeting a debt ratio of 10%. Lines 14 and 16 show that virtually all regions could reach this target around 2030. Even under spending scenario B, where health spending is enriched by 1% per year, 5 jurisdictions could reach a debt ratio of 10% before 2030 (line 18).

Based on the results presented above, population ageing and its related spending pressures appear to be manageable. It is evident that under a range of spending scenarios and a range of fiscal policy regimes, virtually all jurisdictions have some flexibility to engage in discretionary spending while ensuring that debt-to-GDP ratios do not begin to rise considerably.

Table VII: Debt-to-GDP Ratios Under all Spending Scenarios and Fiscal Regimes

Fiscal Regime		Spending Scenario	Debt-to GDP Ratios by Jusrisdiction as of 2040 (per cent)												
			NF	PEI	NS	NB	QC	ON	MA	SA	AL	BC	YK	NT	FED
Tight Fiscal Regime (debt reduction only)	1	Basecase[1]	-171.1	-193.3	-8.7	-94.9	-78.4	-65.8	-152.7	-160.6	-136.6	5.1	-133.2	320.0	-207.6
	2	Scenario A[2]	-198.1	-219.5	-37.5	-119.3	-101.7	-85.5	-174.1	-179.9	-152.9	-18.5	-154.7	297.5	-187.2
	3	Scenario B[3]	-24.4	-140.3	123.7	43.7	10.1	-12.9	-95.3	-105.0	-93.1	81.0	-61.1	611.4	-157.1
	4	Scenario C[4]	408.0	-31.1	333.3	355.6	177.9	82.5	9.2	-5.2	-15.5	214.4	111.0	1003.7	-121.3
Middle Fiscal Regime *0% Target*	5	Basecase	0.0	0.0	15.3	0.8	1.6	0.0	0.0	0.0	0.0	13.3	0.0	320.0	0.0
	6	*date reached*	*2036-37*	*2026-27*	-	-	-	*2036-37*	*2022-23*	*2024-25*	*2010-11*	-	*2029-30*	-	*2031-32*
	7	Scenario A	0.0	0.0	9.8	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	297.5	0.0
	8	*date reached*	*2033-34*	*2025-26*	-	*2034-35*	*2037-38*	*2033-34*	*2021-22*	*2024-25*	*2010-11*	-	*2015-16*	-	*2032-33*
	9	Scenario B	22.8	0.0	123.7	65.2	19.1	6.2	0.0	0.0	0.0	83.3	0.0	611.4	0.0
	10	*date reached*	-	*2030-31*	-	-	-	-	*2027-28*	*2029-30*	*2012-13*	-	*2028-29*	-	*2035-36*
	11	Scenario C	408.0	16.1	333.3	355.6	177.9	96.5	38.0	24.3	20.2	216.1	113.1	1003.7	1.3
	12	*date reached*	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle Fiscal Regime *10% Target*	13	Basecase	10.0	10.0	15.3	10.0	10.0	10.0	10.0	10.0	-	19.6	-	-	10.0
	14	*date reached*	*2028-29*	*2018-19*	-	*2023-24*	*2030-31*	*2022-23*	*2012-13*	*2015-16*	-	-	-	-	*2025-26*
	15	Scenario A	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	10.0	-	-	10.0
	16	*date reached*	*2027-28*	*2018-19*	*2040-41*	*2022-23*	*2028-29*	*2021-22*	*2012-13*	*2015-16*	-	*2008-09*	-	-	*2026-27*
	17	Scenario B	22.8	10.0	123.7	65.2	20.0	10.0	10.0	10.0	-	83.3	-	-	10.0
	18	*date reached*	-	*2021-22*	-	-	-	*2028-29*	*2014-15*	*2017-18*	-	-	-	-	*2027-28*
	19	Scenario C	408.0	16.1	333.3	355.6	177.9	96.5	41.8	25.8	-	216.1	-	-	10.0
	20	*date reached*	-	-	-	-	-	-	-	-	-	-	-	-	*2029-30*
Middle Fiscal Regime *20% Target*	21	Basecase	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	-	-	-	-	20.0
	22	*date reached*	*2020-21*	*2011-12*	*2031-32*	*2012-13*	*2020-21*	*2011-12*	*2002-03*	*2005-06*	-	-	-	-	*2020-21*
	23	Scenario A	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	-	-	-	-	20.0
	24	*date reached*	*2020-21*	*2011-12*	*2028-29*	*2012-13*	*2019-20*	*2011-12*	*2002-03*	*2005-06*	-	-	-	-	*2020-21*
	25	Scenario B	408.0	20.0	123.7	72.1	20.0	20.0	123.7	123.7	-	-	-	-	20.0
	26	*date reached*	-	*2011-12*	-	-	*2025-26*	*2012-13*	*2002-03*	*2005-06*	-	-	-	-	*2020-21*
	27	Scenario C	408.0	35.6	333.3	355.6	177.9	96.5	59.5	45.8	-	-	-	-	20.0
	28	*date reached*	-	-	-	-	-	-	-	-	-	-	-	-	*2021-22*
Loose Fiscal Regime (no debt reduction)	29	Basecase	18.2	10.8	18.5	11.3	14.3	8.7	7.0	8.2	1.3	15.4	0.7	320.0	18.3
	30	Scenario A	18.2	10.8	18.3	11.3	14.3	8.7	7.0	8.2	1.3	3.8	0.7	297.5	18.3
	31	Scenario B	30.7	10.8	123.7	70.4	21.9	8.7	7.0	8.2	1.3	84.2	3.0	611.4	18.3
	32	Scenario C	408.0	24.4	333.3	355.6	177.9	112.3	44.7	30.7	24.9	217.0	114.2	1003.7	18.3

1 Health enrichment = 0%, CHST linked to GDP
2 Health enrichment = 0%, CHST linked to health spending after 2010-11
3 Health enrichment = 1%, CHST linked to health spending after 2010-11
4 Health enrichment = 2%, CHST linked to health spending after 2010-11

6. Health Care Spending under Alternative Regimes

Given the importance of health care expenditures in the context of an ageing population, the purpose of this section is to examine the evolution of health care spending under different assumptions regarding the use of the fiscal dividend.

6.1 Paths of Health Care Spending

The previous section showed that most Canadian governments should be able to withstand the upcoming period of demographic change without serious implications for public indebtedness. However, it is unrealistic to assume that governments will pursue exclusively debt reduction and allow budget balances to grow without bound. It is more likely that the fiscal authorities would allocate a fraction of budget surpluses to debt reduction while the rest would be used for some combination of discretionary initiatives.

The three alternative fiscal regimes involve different assumptions regarding the use of the fiscal dividend, and hence, different rates of program enrichment. In the short-term, more debt reduction is bought at the cost of smaller increases to program spending. However, since a lower debt reduces debt servicing costs, there is more room to increase spending in later years. This tradeoff becomes an important consideration in the context of an ageing population, since higher spending is required when ageing pressures are heaviest. The following charts attempt to shed some light on this tradeoff.

Each chart uses the basecase spending scenario since virtually all jurisdictions can eliminate their net debt under this spending scenario. That is, total federal program spending is constant in real per capita terms, while for the provinces, health spending is constant on a real per capita basis. It is then possible to examine the evolution of spending under the loose, middle and tight fiscal stances. Chart 29 shows the evolution of total federal program spending, into which any federal fiscal dividend is recycled. As expected, in the early years of the simulation, a loose fiscal stance produces the highest spending, followed by the middle fiscal stance, and lastly, the tight fiscal stance.[20]

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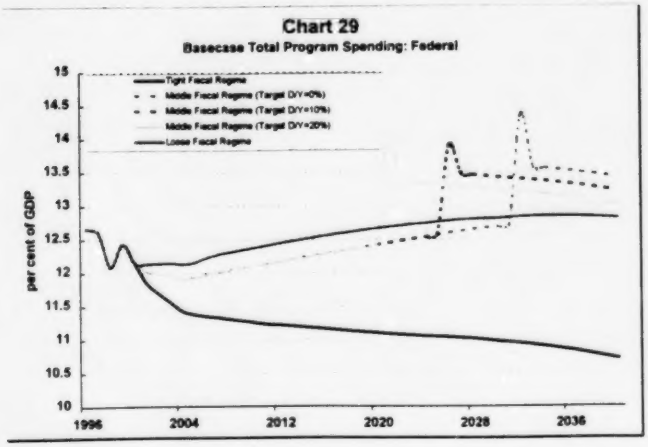
20 Due to circularity issues in the simulations the debt ratio falls below target for one year causing a large dividend and hence, a peak in spending. Since the dividend is exhausted each year, this peak does not affect future years and can be ignored.



However, under the middle fiscal stance, the debt ratio, and therefore, debt servicing costs fall more rapidly. The debt ratio reaches its target of 20% in 2020-21, and is fixed at this level. This produces a larger fiscal dividend which allows a higher level of spending than is possible under the loose fiscal stance. Therefore, under the middle fiscal stance, spending is lower in the short-term, but higher towards the end of the simulation period. The same effect is seen if a target debt ratio of 10% or 0% is chosen under the middle fiscal stance. Spending remains below that possible under the loose fiscal stance, but reaches a higher level towards the end of the simulation period.

There are two important implications of this analysis. The first is that decisions taken now concerning the allocation of the fiscal dividend will have implications on the size of future dividends and hence, the degree to which future program spending can be enriched. Secondly, in the context of an ageing population governments need to evaluate *when* higher spending is most important since different fiscal stances result in higher spending at *different points* over the simulation period.

For virtually all provincial governments, the same effect is found (charts 30-41). Under the tight fiscal stance (the solid black line), none of the surplus is allocated to health spending, so expenditures grow only with population growth, population compositional change and inflation. Therefore, this path indicates the level of health spending required to maintain real per capita spending in the context of an ageing population. The other two paths show the evolution of health spending under a middle (target debt ratio of 0%) or loose fiscal stance (no debt reduction).

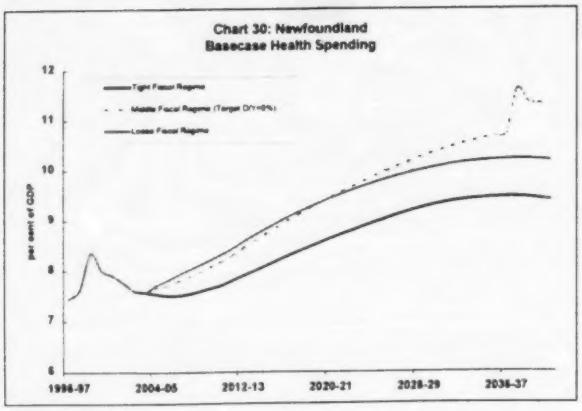


Chart 30: Newfoundland
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

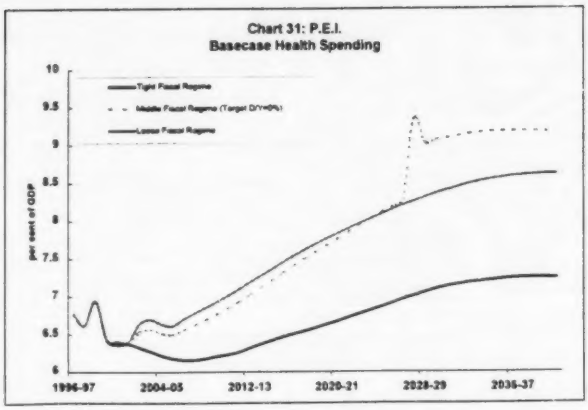


Chart 31: P.E.I.
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

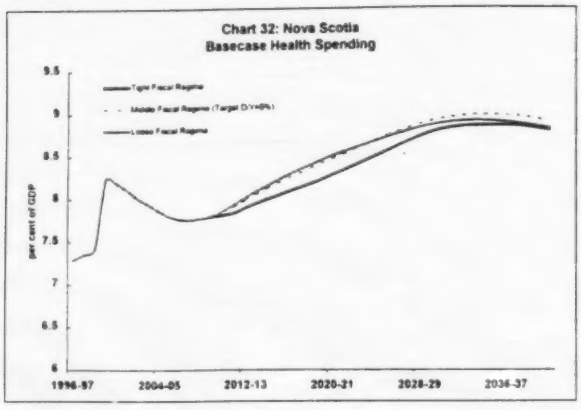


Chart 32: Nova Scotia
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

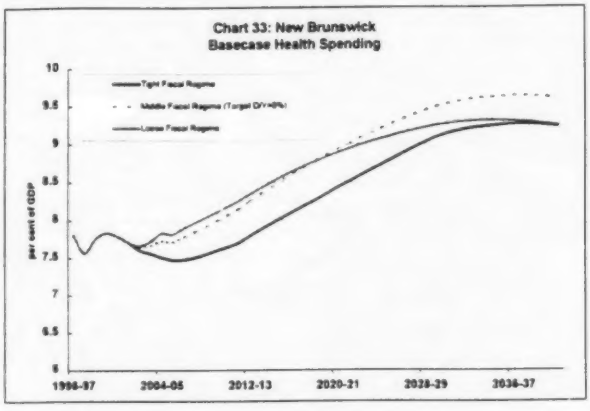


Chart 33: New Brunswick
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

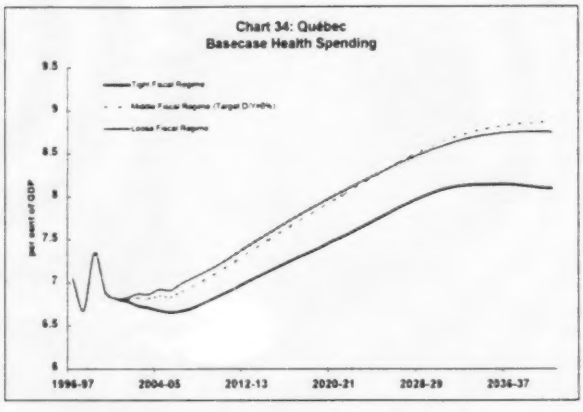


Chart 34: Québec
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

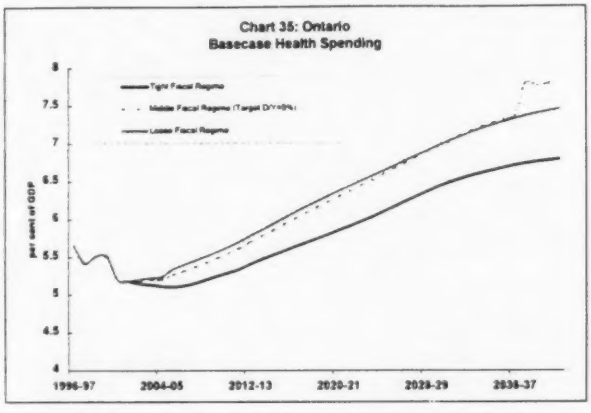
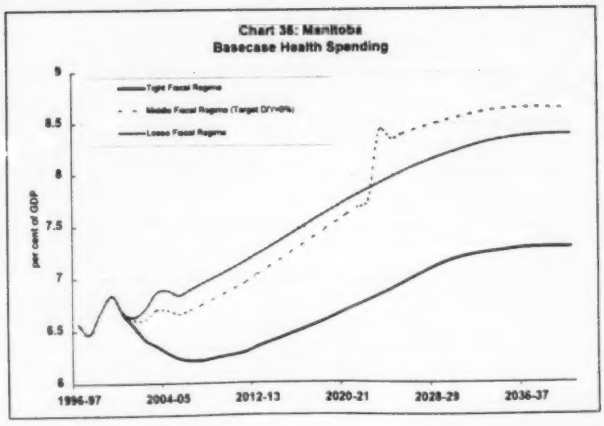
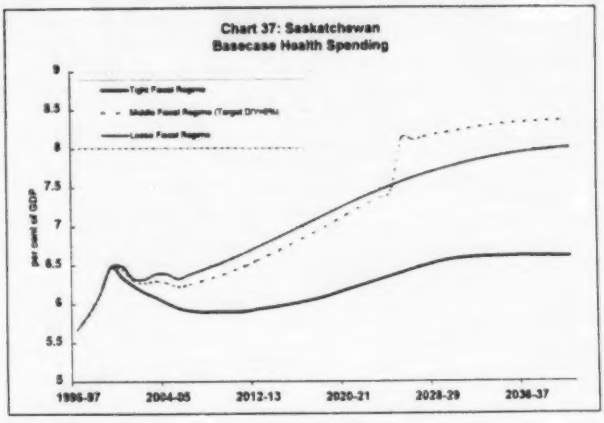
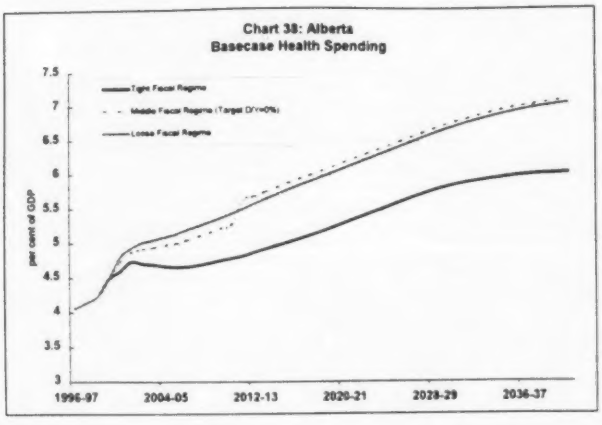
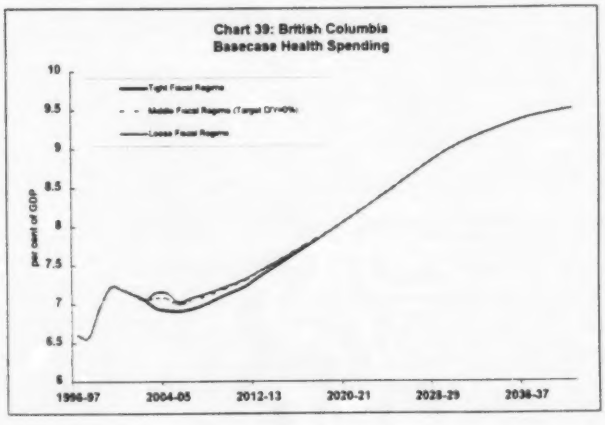


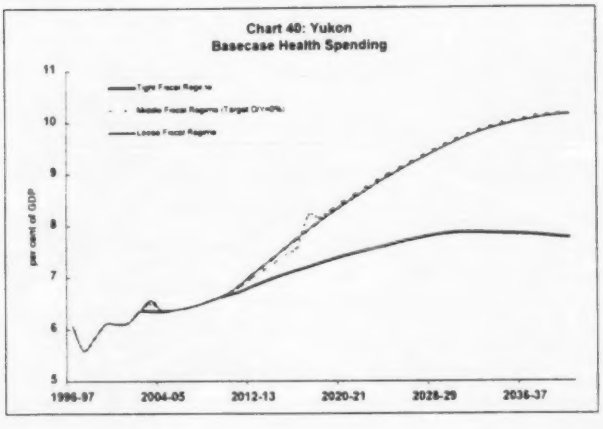
Chart 35: Ontario
Basecase Health Spending
per cent of GDP
1996-97
2004-05
2012-13
2020-21
2028-29
2036-37

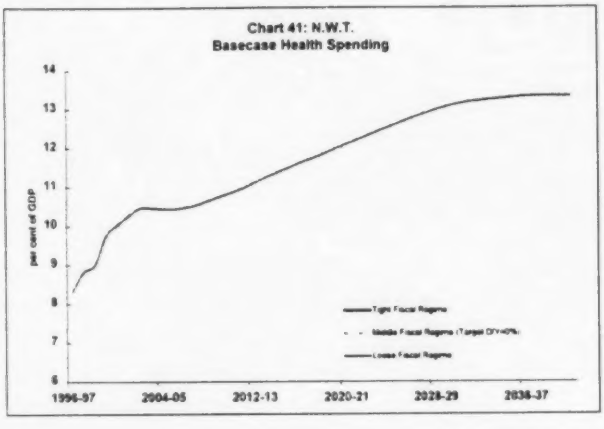












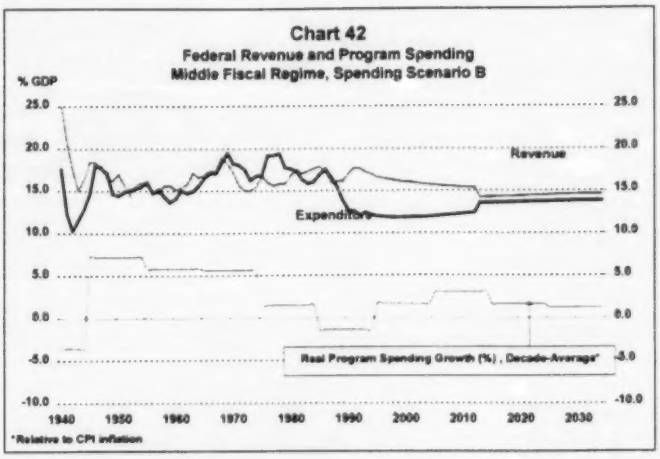
In the context of ageing pressures, spending on health care will be very important fiscally. The above analysis examined the evolution of health care spending under various fiscal stances. An important result is that increases to health care spending, further to that necessary to maintain real per capita spending levels, are possible for the majority of jurisdictions while also ensuring that debt remains on a downward track. Furthermore, decisions regarding the use of the fiscal

dividend now have important consequences for future fiscal dividends and hence, the ability of governments to spend in the future. An evaluation of fiscal stances under all other spending scenarios is contained in Appendix F.

6.2 Results in an Historical Context

Finally, though results indicate that population ageing need not have any serious repercussions for public indebtedness, they also reveal that public finances will not be totally insulated from the effects of population ageing. Any ageing related impacts will be realised in the rates at which governments can reasonably enrich the level of public goods and services.

In order for the federal government to pursue a 'balanced' fiscal plan of tax cuts and targeted spending, while reducing and then maintaining a fixed debt-ratio of 20%, real program spending growth will have to be much lower than that of recent history (Chart 23). Real spending growth through the simulation averages less than one-third the rates posted during the 1960s and 1970s. However, real federal spending growth would be roughly equivalent to what it was during the 1980s (though the 1980s marked first serious, if unsuccessful, attempt at spending restraint).



For the provincial-territorial sector, future rates of program spending growth are harder to evaluate as less historical data are available (Chart 24). However, if provincial-territorial governments were also to pursue a middle (or a 'balanced') fiscal regime, while attempting to target and then maintain a debt ratio of 0%, simulated real program spending growth rates must, in many cases, be similar to the rates of the 1980s. Again, this would represent a significant slowdown from the program spending rates of the 1960s and 1970s.[21]

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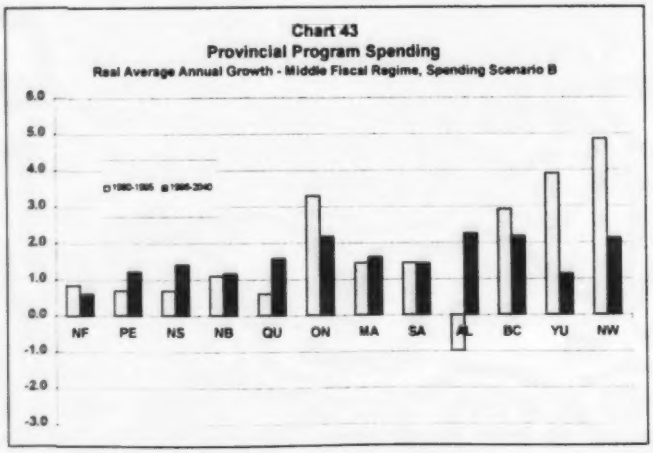
21 National accounts data are available over a longer historical period than the publicaccounts data used in the simulations. On this basis, provincial real program spending growth (relative to CPI inflation) was higher than federal spending growth during the 1960s, but about the same as at the federal level during 1970s and 1980s. It can be therefore be inferred that provincial-territorial program spending growth rates equivalent to those of the 1980s also represents a significant reduction from the growth rates of previous decades.



6.3 Interpreting the Results

One implication of the debt simulations is that slower growing provinces, such as Newfoundland, will be better placed to adopt looser overall fiscal stances in the coming years than faster growing provinces, such as British Columbia. There are some straightforward reasons for this outcome. First, initial starting positions are important in affecting fiscal outcomes. Current fiscal positions vary widely among jurisdictions. To support a balanced budget in the year 2000-01, Newfoundland requires a primary surplus of about 5.1% per cent of GDP. British Columbia, meanwhile, requires a primary surplus of less than 1% per cent of GDP. When a jurisdiction with a high initial operating surplus lowers its indebtedness, it is also able to ease the high fiscal effort (i.e. low program spending relative to revenue) necessary to start the process of debt reduction in the first place. As a result, relative to its current fiscal position, Newfoundland simply has more to gain by substantially lowering its debt.

There are also important population growth and age-profile differences between jurisdictions. These have important implications for fiscal balances, and not all of them will be negative. Just as an ageing population will raise the relative cost of health care, so too will an ageing population reduce the relative costs of education, and to a lesser degree, social services. Though any offset will not be complete, the compensatory effect can be significant. Most importantly, the more pronounced the ageing in a particular jurisdiction, by definition, the larger this cost offset will be. In this sense, the fiscal costs of population ageing are self-limiting.

It is also important to consider that in a regime where governments maintain per capita levels of program expenditure, a shrinking population base will (all other things being equal) result in falling program spending. The interaction of relative and absolute spending levels has important consequences for provinces such as Newfoundland and British Columbia. Newfoundland, for instance, is projected to have higher per capita health spending growth than British Columbia, but lower total health spending growth.

Finally, there is an asymmetry in the responses of program expenditure and GDP to population change. Under a constant real per capita expenditure regime, any population growth (decline) will lead to a spending growth (decline) of equal magnitude; for GDP, a given

population change will result in a proportional but less than unitary response. The reason is labour's less than unitary share of income – a one unit increase (decrease) in labour input will increase (decrease) total economic output by less than one unit. When population growth slows, therefore, there can be a net positive outcome for expenditure-to-GDP ratios.

Considered together, the implication is that jurisdictions with the fastest population growth rates will not necessarily be the ones with the more favourable fiscal outcomes. However, nor will slower growing provinces such as Newfoundland find a 'windfall' in population ageing. A more considered interpretation of the results shows that factors exist which may mitigate the negative impacts of ageing, and as well, there are the normal gains from debt reduction. These gains become all the more important in the context of an ageing population.

7. Conclusion

Simulations suggest that Canadian jurisdictions should be able to weather the longer-run challenge of demographic change. Our results confirm those of previous studies, which predict a rapid decline in Canada's debt load. We find that under a range of fiscal policy scenarios, and for the majority of jurisdictions, net debt could be substantially reduced within a horizon of about 20 years. We also find that even under fiscal policy regimes that provide for such substantial debt reduction, governments will have some fiscal room to reduce taxes and increase spending.

Undoubtedly, there will be ageing pressures on public finances over the next 40 years. However, the timing of these pressures is critical. Ageing pressures will be relatively modest over the next 10 years. It is only after this period that the real challenge of demographic change emerges. Thus, this period provides governments with an opportunity to plan and prepare in order to ensure fiscal integrity. The fiscal choices of today will in large part determine how government finances fare through this upcoming period of demographic change. Due to the importance of compounding in the debt-dynamic process, starting points matter: the more fiscal discipline a jurisdiction exercises in the short-term, the larger will be its longer-run room-to-manoeuvre. In choosing a fiscal plan, governments must carefully examine expected future spending needs, since decisions made now concerning the allocation of fiscal dividends will effect the size of future fiscal dividends. In order to accommodate future spending pressures, debt consolidation is an essential part of the fiscal mix.

Population ageing will not be without consequences for public finances. Though there need not be any serious implication for public dissaving, population ageing and the related economic and fiscal impacts will significantly lower the rate at which federal and provincial-territorial governments programs can be enriched. The importance of lower rates of program enrichment should not be underestimated, particularly given the pressure that will be placed on the public health care system. Results indicate that room exists to enrich health spending while maintaining falling debt paths, but whether these higher levels of spending will be judged adequate to meet the health care needs of Canadians is more difficult to ascertain.

Appendix A

Model Description

A straightforward accounting model is used to extrapolate government debt paths. Each program expenditure and revenue category is extrapolated separately. These items are then aggregated and incorporated into the government budget constraint to recover the resulting budget balance and debt-ratio series.

Expenditure
Program expenditure items that are affected by demographic changes are extrapolated using the following equation:

$$G_t = G_{t-1} * \left(\dot{POP}_t * \dot{INFL}_t * \dot{DEMO}_t * \dot{ENRICH}_t \right)$$

where G_t is the level of expenditure in a particular category, POP_t is the population growth rate, $INFL_t$ is the inflation rate, $DEMO_t$ is program spending growth due to compositional change within the population and $ENRICH_t$ is the real per capita spending enrichment rate, after all preceding effects have been accounted for.

The DEMO variable takes the following form:

$$\dot{DEMO}_t = \left(\frac{\sum_i E_i * \left(\frac{POP_t^i}{POP_t} \right)}{\sum_i E_i * \left(\frac{POP_{t-1}^i}{POP_{t-1}} \right)} - 1 \right)$$

where E_i is real per capita expenditure for population cohort i relative to that on some other age cohort (say the 45-54 age group) and POP^i, is the population in the i^{th} cohort. As such, if the total population shares of the i cohorts do not change (i.e., Δ POPi/POP=0, $\forall$i), then the compositional effect on expenditure will be zero.

Revenue
Revenue items that are affected by demographic changes are extrapolated using an equation similar to that used to extrapolate program expenditures. The principal difference is that in the DEMO variable, E_i no longer represents expenditure on population cohort i, but rather the revenue yield from the i^{th} cohort, again relative to some numeraire cohort.

Budget Balance

Finally, all expenditure and revenue series are then introduced into the standard government budget constraint:

$$D_t = D_{t-1} * (1 + r) - (R_t - PE_t - DC_t)$$

where D_t is the level of the debt, r is the effective interest rate on that debt, R_t is total revenue, PE_t is total program expenditure and DC_t are debt charges.

Appendix B

Modelling Federal-Provincial Transfers

The fiscal positions of federal and provincial-territorial governments are linked through a transfer regime. Major transfers include the Canada Health and Social Transfer (CHST), Equalisation, and Territorial Formula Financing. There are also a multitude of smaller transfer and shared-cost agreements of much lesser importance. The modelling of each is described below.

CHST

The CHST is a block fund which transfers federal funds to the provinces and territories in support of health care, post-secondary education and social assistance programs. The CHST transfer entitlement is provided in the form of both cash transfers and tax point transfers.

In the model, the entitlement is calculated according to the following:

$$ENTITLEMENT_t = ENTITLEMENT_{t-1} \cdot (GDP_t / GDP_{t-1})$$

$$TAXPOINT_t = \alpha \cdot BFT_t + \beta \cdot CTI_t$$

$$CASH_t = ENTITLEMENT_t - TAXPOINT_t$$

Where:
ENTITLEMENT = CHST transfer entitlement;
TAXPOINT = value of CHST taxpoint transfer;
BFT = basic federal tax;
CTI = corporate taxable income;
CASH = CHST cash payment.

This is virtually identical to the actual formula used to calculate CHST transfer. There are some minor differences, however:

- The actual CHST entitlement is calculated is based on the three-year moving average GDP growth; in the model, as GDP growth is assumed to equal its (smooth) potential rate, year-to-year GDP growth is used.

- For simplification, in the model, BFT and CTI are fixed their historical GDP shares model (as a result, in a case where federal personal income tax is lowered, the cash component of the CHST transfer in the model will actually be understated).

The allocation of the CHST is according to the Provincial Allocation Formula. A jurisdiction's share is based partially on its 1997-98 share, and partially on its population share. In the model, the share of jurisdiction *i* in each year:

$$\alpha \cdot CHST_{i,97\text{-}98} + (1-\alpha) \cdot POP_{i,t} / POP_t$$

The current Allocation Formula includes a provision for decreasing the weight on the 1997-98 CHST share (α) from 0.9 in 1998-99 to 0.5 by 2002-03.

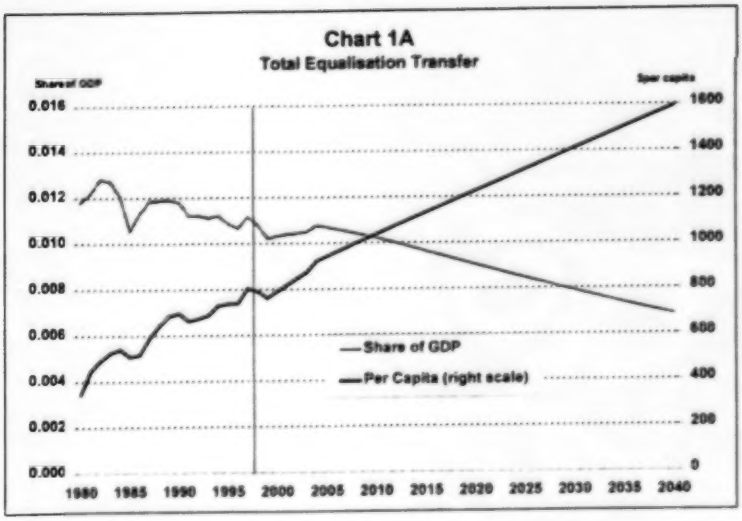
In the model, allocation is based on this same formula. In addition, the declining weight schedule is assumed to continue such that after ten years, allocation is on a strictly per capita basis.

There is one further aspect to the CHST transfer. During the 1960s, when the federal government provided cash and tax point transfers to the provinces, the government of Québec requested and received a greater share of its total funding in the form of tax points (Alternative Payments for Standing Programs – APSP). In 1996, with the elimination of EPF and CAP (predecessors to the CHST), Québec was no longer eligible to receive these annual tax point transfers, and is now obliged to pay them back. The repayment of APSP, netted out Québec's cash entitlement, increases the reported cash portion of CHST entitlements. To model APSP, they were projected as a function of the tax point component of the CHST entitlement.

Equalisation

The Equalisation program provides unconditional federal cash transfers to provincial governments that have a low capacity to raise revenues. Equalisation payments are determined by comparing per capita revenue-raising capacity, across a range of revenue sources, to those a five-province standard. Currently, seven provinces qualify for Equalisation: Newfoundland, P.E.I., Nova Scotia, New Brunswick, Québec, Manitoba and Saskatchewan.

Modelling Equalisation transfers in the same way they are calculated (that is, individually by revenue source, and then aggregated) was impractical. Instead, for each of the seven eligible provinces, a simple trend was fitted to its per capita entitlement over the 1980-81 to 1998-99 period. Per capita Equalisation funding was then extrapolated at trend growth rates. The total transfer in each eligible province was recovered by multiplying by its population. The resulting total Equalisation projection for the seven eligible provinces is shown in Chart 1A below.



Territorial Formula Financing

Territorial Formula Financing (TFF) is an annual transfer from the federal government which enables the territorial governments to provide public services comparable to those of the provinces. It is necessitated by the weak revenue bases and high cost of providing services in the North.

The TFF grant is calculated based on the expenditure needs and revenue raising capacity of territorial governments. In each year, the grant can be summarised by the following:

TFF GRANT = GROSS EXPENDITURE BASE - ELIGIBLE REVENUES

Where:
GROSS EXPENDITURE BASE = expenditure needs of the territorial governments in a particular year;
ELIGIBLE REVENUES = the revenues the territories would have if their tax effort was similar to the provinces.

TFF grants were extrapolated as a function of their trend shares of total Canadian output.

Other Transfers

Finally, 'other' transfers are a far smaller and much less significant source of revenue compared to the major transfers programs: federal transfers represents about one-third of provincial-territorial revenue; 'other' transfers represent less that one-seventh of federal transfers. 'Other' transfers were kept fixed relative to the major transfer categories.

The Impact of Federal Tax Changes on Provincial Taxation and Transfers

It is important to recognise that provincial PIT revenue, CHST transfers and Equalisation can all be affected by changes to the federal PIT tax regime:

- The PIT collections of most provinces are linked to those of the federal government through the Tax Collection Agreement (TCA). Provinces subscribing to the TCA simply set their PIT rates as a percentage of the basic federal tax. Consequently, when the federal government changes its PIT rates, the PIT collections of provincial governments are also affected.

- The cash component of the CHST transfer is the residual of the total entitlement, after the tax point component has been accounted for. The tax point component is a function of the basic federal tax. Thus, changes in the basic federal tax can affect the CHST cash transfer.

- Finally, Equalisation payments are calculated based on a 5-province standard. Because federal PIT changes can affect provincial PIT – including that of the provinces in the standard – Equalisation transfers can be affected by changing federal PIT rates.

The modelling of federal-provincial transfers is complicated by the linkages between that exist between federal and provincial PIT. The easiest solution is to disregard them. There is some justification for doing this:

- Changes to federal PIT affect provincial PIT and transfers in opposite directions. Provincial PIT and Equalisation payments would, all other things being equal, decrease if federal PIT was lowered; the CHST cash transfer, on the other hand would increase. The impacts would to some degree offset each other.
- Abstracting from federal-provincial revenue linkages is equivalent to assuming provincial territorial government take whatever discretionary action is necessary to keep their PIT shares of GDP fixed. Such an assumption is not implausible in an environment where: (i) the federal government is substantially reducing its PIT take; (ii) the *total* government PIT burden is decreasing; and, (iii) most provincial governments have already taken discretionary action lowering their own PIT rates. This assumptions simply implies acting to maintain the *status quo*.

Appendix C

Economic and Demographic Assumptions

		2000-01	2005-06	2010-11	2015-16	2020-21	2025-26	2030-31	2035-36	2040-41
Nfld	GDP Growth	38	26	24	24	23	22	21	19	18
	Pop Growth	-02	-04	-06	-07	-07	-07	-07	-07	-07
	Effective Rate*	120	120	120	120	120	120	120	68	68
	Discount Rate	82	95	96	96	98	99	100	49	50
PEI	GDP Growth	27	31	30	29	28	27	25	24	22
	Pop Growth	06	04	03	03	02	01	00	-01	-01
	Effective Rate*	102	101	101	101	68	68	68	68	68
	Discount Rate	75	71	72	72	40	41	43	44	46
NS	GDP Growth	29	30	28	28	27	25	24	23	21
	Pop Growth	03	02	01	01	00	-01	-01	-02	-03
	Effective Rate*	89	89	89	89	89	89	89	89	89
	Discount Rate	60	59	60	61	62	63	65	66	67
NB	GDP Growth	31	28	27	28	26	25	24	22	21
	Pop Growth	02	01	00	00	-01	-01	-02	-03	-03
	Effective Rate*	108	108	108	108	108	108	108	108	108
	Discount Rate	77	80	80	80	82	83	84	86	87
Que	GDP Growth	31	32	31	31	29	28	26	25	23
	Pop Growth	08	07	06	05	04	03	02	01	00
	Effective Rate*	86	86	86	86	86	86	86	86	86
	Discount Rate	55	54	55	55	56	58	59	61	62
Ont	GDP Growth	36	37	36	35	33	31	30	28	27
	Pop Growth	16	15	14	13	11	10	08	06	05
	Effective Rate*	81	81	81	81	81	81	68	68	68
	Discount Rate	45	44	45	46	47	49	37	39	41
Man	GDP Growth	32	31	30	30	29	28	27	25	24
	Pop Growth	05	05	04	04	04	03	02	01	01
	Effective Rate*	71	71	71	67	67	67	67	67	67
	Discount Rate	39	40	41	37	38	40	41	42	44
Sask	GDP Growth	29	29	28	28	28	27	26	24	23
	Pop Growth	01	01	01	01	01	01	00	00	00
	Effective Rate*	93	84	84	84	67	67	67	67	67
	Discount Rate	65	55	56	56	40	41	42	43	45
Alberta	GDP Growth	34	36	34	34	32	30	29	27	26
	Pop Growth	13	12	11	10	09	07	06	05	03
	Effective Rate*	73	73	73	108	82	75	72	71	70
	Discount Rate	39	37	38	74	50	45	43	44	44
B.C.	GDP Growth	26	37	36	35	34	32	30	28	27
	Pop Growth	18	15	14	12	11	09	08	06	05
	Effective Rate*	71	72	72	72	72	72	72	72	72
	Discount Rate	45	35	36	37	39	41	42	44	46
Yuk	GDP Growth	12	34	31	29	28	27	27	26	25
	Pop Growth	12	09	06	04	03	03	03	03	02
	Effective Rate*	67	100	100	100	100	68	68	68	68
	Discount Rate	54	66	69	71	72	41	41	42	43
NWT	GDP Growth	18	41	38	37	35	32	31	28	26
	Pop Growth	19	18	17	16	13	10	08	06	05
	Effective Rate*	67	100	100	100	100	100	100	100	100
	Discount Rate	49	59	62	63	65	68	69	72	74

*Once a province has eliminated its debt and moves into a net asset position, the effective rate (now earned rather than paid) switches to that of a 10-year provincial bond. It would be unrealistic for a province to earn the same (generally higher) interest rate on an asset that it was obliged to pay on its debt.

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